

TOTAL SERUM CALCIUM (TSC) AND ALBUMIN CORRECTED CALCIUM (ACC) AS SEVERITY PREDICTORS IN ACUTE PANCREATITIS IN A SOUTH INDIAN GOVERNMENT TEACHING HOSPITAL

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ABSTRACT

BACKGROUND

Although the identity of the pancreas has been known, its critical digestive functions were recently appreciated. Pancreas is an organ in the middle of the upper abdomen, close to the first part of the small intestine, the duodenum. It produces specialized proteins called enzymes that are important in the digestion of proteins, fats, and sugars. We wanted to evaluate total serum calcium and albumin corrected calcium as prognostic severity factors in acute pancreatitis

METHODS

This prospective study was conducted in a tertiary hospital from July 2015 to June 2016. All patients who were diagnosed as acute pancreatitis by clinical examination, laboratory-, radiological- and biochemical-investigations were considered as subjects. Serum calcium & albumin corrected calcium were measured within 24 hrs. of admission. Patients were followed up for a maximum period of 4 weeks & outcomes also studied, in terms of expiry, local complications or systemic complications. Significance of Serum Calcium and Albumin Corrected Calcium in predicting outcome of acute pancreatitis was assessed and compared with BISAP score.

RESULTS

Specificity of hypocalcaemia (calcium<7.5) in predicting severity of acute pancreatitis is 80%. Specificity of low ACC (<7.5) in predicting severity of acute pancreatitis is 89%. Specificity of high BISAP Score (>3) in predicting severity of acute pancreatitis is 97%.

CONCLUSIONS

Hypocalcaemia & low ACC can predict severity of acute pancreatitis, as with BISAP score, but it is not superior to BISAP score.

KEYWORDS

Total Serum Calcium, Albumin Corrected Calcium, Acute Pancreatitis, Hypocalcemia, Congenital Malformations.

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BACKGROUND

Although the identity of the pancreas has been known, its critical digestive Functions were recently appreciated. The pancreas is an organ in the middle of the upper abdomen, close to the first part of the small intestine, the duodenum. It produces specialized proteins called enzymes that are important in the digestion of proteins, fats, and sugars. The pancreas also produces insulin and other hormones important in maintaining normal blood sugar levels. Pancreatitis is an inflammation, or swelling, of the pancreas.^{1,2}

The term pancreatitis means "all flesh or meat", which distinguished it from bone or Cartilage Causes of pancreatitis include gallstones and toxins such as excessive alcohol. In children, common causes include viruses and other infections, medications, congenital malformations and other inherited conditions, and trauma to the abdomen. In 1 out of 4 childhood cases, a cause is never found. Acute pancreatitis is an inflammatory process of the pancreas that affects other regional tissues and distant organ systems in different ways. Histologically it is characterized by acinar cell necrosis and the Presence of inflammatory infiltrate in the parenchyma.³ The incidence of acute pancreatitis in the United States varies from 4.9 to 73.4 Per 100,000 patients. It is the third most common gastrointestinal disorder requiring acute hospitalization in the United States, with annual costs exceeding \$2 billion. Approximately 20% of Patients develop severe acute pancreatitis, defined by organ failure or necrotizing pancreatitis. The overall mortality rate from acute pancreatitis appears to be decreasing gradually to less than 5 percent.

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Although it is generally self-limited, through the Acute Pancreatitis classification criteria from 1992, it has been determined that on average, 20% of the patients present with severe disease, have mortality rate of 50%. In most Western countries, gallstones are the most frequent cause of pancreatitis, in approximately 50% of patient, followed by alcohol in 20%. In approximately 20% of cases, the cause remains unknown (idiopathic). The remaining 10% constitutes these causes such as Hypocalcaemia, hypertriglyceridemia, medications, hereditary causes, sphincter of Oddi Dysfunction, pancreas divisum, pancreatic neoplasms, and others.^{4,5} The clinical presentation includes severe abdominal pain. The most important imaging modality at admission is transabdominal ultrasound in order to detect gallstones or sludge in the gallbladder or in the common bile duct. If the aetiology remains unknown, endoscopic Ultrasound can be used to detect gallstones or sludge in the gallbladder or common Bile duct. CECT is used to diagnose per pancreatic collections and pancreatic Parenchymal or per pancreatic fat necrosis. Magnetic resonance imaging (MRI) or ultrasonography are the only Modalities capable of demonstrating the presence or absence of necrosis in such collection. Biochemical markers have also turned out to be useful predictors. Examples of some of them are C-reactive protein, Procalcitonin, interleukin-6, thioredoxin-1, and polymorph nuclear elastase.⁶ Hypocalcaemia Has been associated with AP severity but its etiopathogenesis has been a subject to debate for Decades. The General consensus is that 2 of the following 3 characteristics are necessary for making AP diagnosis include Intense epigastria pain, a serum amylase or lipase concentration 3 times higher than the normal limit and characteristic AP findings through computed tomography. The clinical course varies significantly from person to person. The use of prognostic scales enables severe cases to be detected and Opportune and adequate management to be established.^{7,8,9} The most widely used are the Ranson, BISAP, APACHE-11 SCORES and the Balthazar tomography severity index. Treatment mainly consists of putting the pancreas to rest (i.e. no eating or drinking) and relieving any associated pain. Initially, an intravenous line (IV) is placed to give fluids and medications. A nasogastric tube (a small flexible tube introduced via the nose into the stomach) may be placed to suck fluid from the stomach. Typically, food is reintroduced within a few days, either by mouth or through the nasogastric tube. Most people, children in particular, recover within a week, with no permanent damage to the pancreas.^{10,11}

BISAP [Bedside Index for Severity in Acute Pancreatitis]

In 2008, Bedside Index for Severity in Acute Pancreatitis (BISAP) score was proposed for the early recognition of patient at risk of mortality. This 5 point scoring system is comprised of variables such as Blood urea nitrogen level >25 mg/dl, Impaired mental status, Development of systemic inflammatory response syndrome (SIRS), Age > 60 years and Presence of pleural effusion.¹²

METHODS

Sampling Method

A Hospital Based Retrospective Cohort Study was done in Surgical wards of Rajiv Gandhi Institute of Medical Sciences (RIMS) for a period one year i.e., from December 2017 to November 2018. Patients with acute pancreatitis > 14 years of age were included in the study. Consecutive sampling method was followed. 100 consecutive patients were enrolled using a pre-structured proforma and questionnaire. Clinical and demographic data with respect to Gender, Age, Reasons for admission, Clinical history & Acute pancreatitis as provisional diagnosis was collected from medical records. Laboratory or pathological investigations such as serum amylase, serum lipase, total calcium, serum albumin, BISAP score, Ultra sound sonography, CECT abdomen were taken 24 hrs. after Admission. All patients with acute pancreatitis who are admitted within 72 hrs. of symptoms onset were included in this study. Serum calcium and Albumin Corrected Calcium were measured within 24 hrs. of admission. Then patients followed up for a maximum period of 4 weeks and outcomes studied in terms of symptoms relieved/Patients expired/ complications developed such as systemic complications or local complications. Ethical approval was taken from respective Ethical committee. After taking consent from the patients, a self-designed data collection form was used to collect data. Complete information was analysed and documented.

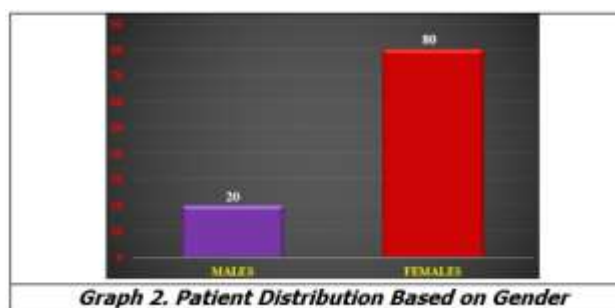
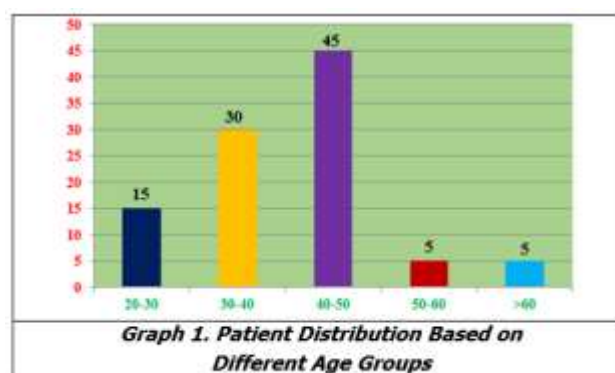
Operational Definition

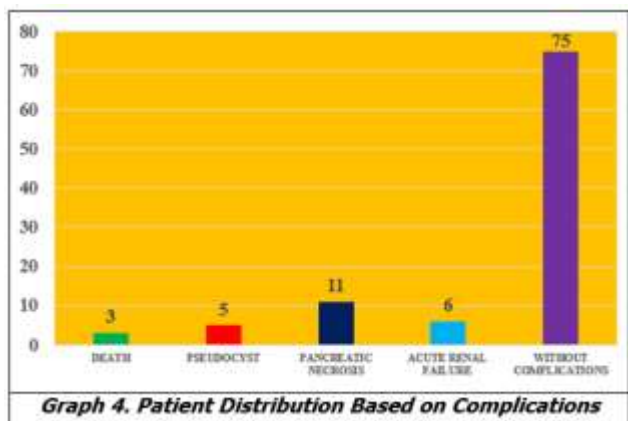
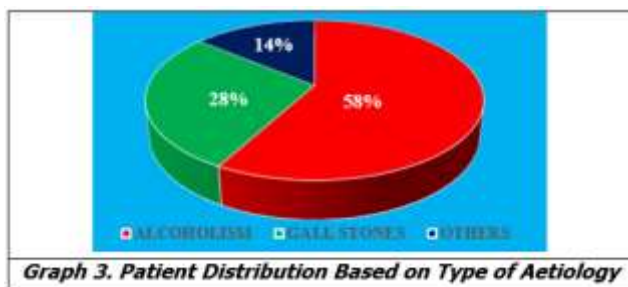
Adjusted calcium level = Total Calcium + (0.8 × [4 – Serum albumin]).

Statistical Method

Data obtained was entered and coded in MS – EXCEL. Analysis was carried out using SPSS software.

RESULTS





cases were males & 20 cases were females, ratio was found to be 4:1. Alcoholism accounted for 58%, gall stones accounted for 28% and 14% of cases due to other etiological factors. These results are compared with "A Study of Epidemiology and Clinical Profile of Acute Pancreatitis in a Tertiary Hospital in South India" in which most of the cases of acute pancreatitis belonged to age group of 30-40 years and the ratio of occurrence in males and females was 3:1. Alcoholism accounted for 53%, gall stones accounted for 21% and 26% of cases due to other etiological factors. In western literature, presence of gall stones was found to be maximum causative factor for Acute pancreatitis, but in India, alcoholism is the common aetiological factor for developing acute pancreatitis. In our study, 3 patients expired, 5 patients suffered with pseudocyst, 11 patients with pancreatic necrosis, 6 patients with Acute Renal failure and remaining 75 patients completely relieved from disease without developing Complications. serum calcium, albumin corrected calcium, total BISAP score were measured for all patients. Mean calcium value was 6.9 for those patients who developed complications or who expired, & mean calcium level was found to be 7.84 for patients who did not develop any complications. I categorized patients based on corrected calcium levels i.e., ≤ 7.5 and > 7.5 . In a total of 39 patients with serum calcium ≤ 7.5 , 24 patients have expired or developed complications. In a total of 61 patients with serum calcium > 7.5 , only 1 patient developed complication. Specificity of hypocalcaemia (calcium ≤ 7.5) in predicting severity is 80%. This is comparable with "Total serum calcium and corrected as severity Predictors in acute pancreatitis research work done by A. A. Gutierrez Jimenez, E. Castro Jimenez, R. Lagunes Cordoba in which specificity of hypocalcaemia in predicting severity is 82%. In a total of 30 patients with adjust calcium ≤ 7.5 , 22 patients have expired or developed complications. In a total of 70 patients with ACC > 7.5 , only 3 patients developed complications. Specificity of low AAA (≤ 7.5) in predicting severity is 89%. This is comparable with "Total serum calcium and corrected as severity Predictors in acute pancreatitis research work done by A. A. Gutierrez Jimenez, E. Castro Jimenez, R. Lagunes Cordoba in which specificity of low ACC in predicting severity is 90%. I also categorized patients based on BISAP score ≤ 2 & ≥ 3 . In a total of 15 patients with BISAP score ≥ 3 , 13 patients have expired or developed complications. In a total of 85 patients with BISAP score ≤ 2 , 12 patients developed complications. Specificity of high BISAP score (≥ 3) in predicting severity is 97%. This is comparable with "bed side index of severity in acute pancreatitis (BISAP) score for predicting prognosis in acute pancreatitis" 59 by Jayant L. Padnekar & team, in which specificity of high BISAP score in predicting severity is 97.5%.

Outcomes	Normal	Mean	Standard Deviation	p Value
Serum Calcium	25 75	6.90 7.84	0.25 0.37	is considered as moderate significant value
Albumin Corrected Calcium (ACC)	25 75	7.38 7.93	0.13 0.31	p= 0.05 is considered as moderate significant value
Total BISAP	25 75	2.60 1.01	0.76 0.70	p= 0.05 is considered as moderate significant value

Table 1. Distribution of Serum Calcium, ACCI and Total BISAP

Serum calcium crosstab	Outcomes	Total
≤ 7.5 Count % within serum calcium crosstab	15 38.5%	24 61.5%
> 7.5 Count % within serum calcium crosstab	60 98.4%	1 1.6%
Total Count % within serum calcium crosstab	75 75.0%	25 25.0%

Table 2. Relationship Between Hypocalcaemia and Crosstab Outcome

BISAP.CAT	Outcomes	Total
< 2 Count % within BISAP.CAT	73 85.9%	12 14.1%
> 3 Count % within BISAP.CAT	2 13.3%	13 86.7%
Total Count % within BISAP.CAT	75 75.0%	25 25.0%

Table 3. Relationship between BISAP Score and BISAP.CAT Outcome

DISCUSSION

According to present research study, in a total of 100 patients (i.e., 100% of population), Acute pancreatitis commonly observed in the age group of 40-50 years. 80

Outcomes Sought are-

1. Cure of patient's disease.
2. Elimination or reduction of patient's symptomology.
3. Arresting or slowing down of disease progression.
4. Prevention of disease and its complications.

CONCLUSIONS

Most of the patients (75 patients) with pancreatitis were in the age group of 30-50 years. 80% of patients were males & 20% patients were females. Alcoholism was found to be one of the major etiological factor for pancreatitis and accounted for 58%. Patients with complications due to pancreatitis had lesser serum calcium, adjusted calcium, albumin corrected calcium & higher BISAP scores when compared to patients without complications. Recommendation to Harari Regional Medical Office (RIMS, Kadapa) is to strengthen the health extension program in order to mobilize community to utilize health facilities to improve quality of life of patients suffering from acute pancreatitis.

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