

Original Research Article

Total serum calcium and corrected calcium as severity predictors in acute pancreatitis: a prospective study in a tertiary hospital in South India

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ABSTRACT

Background: Acute pancreatitis still remains a disease of growing burden to mankind; it is an unpredictable, potentially lethal disease with a high mortality. The incidence of acute Pancreatitis appears to be increasing. Aim of the study was to evaluate total serum calcium and 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 the patients who were diagnosed to have acute pancreatitis by clinical examination, laboratory, radiological and biochemical investigations were considered as cases. Serum calcium and albumin corrected calcium measured within 24 hours of admission. Patients followed up for a maximum period of 4 weeks and outcome studied, in terms of whether patient had local or systemic complication, mortality. Significance of serum calcium and albumin corrected calcium in predicting outcome of acute pancreatitis is assessed and compared with BISAP score.

Results: Acute pancreatitis most commonly occurs in the age group of 30-50. 80% of acute pancreatitis occurs in male and 20% in female. Alcoholism accounts for 58% cases of acute pancreatitis and gall stone account for 28% of acute pancreatitis.

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

Keywords: Albumin corrected calcium, BISAP, Serum calcium

INTRODUCTION

Acute pancreatitis still remains a disease of growing burden to mankind; it is an unpredictable, potentially lethal disease with a high mortality. The incidence of acute pancreatitis appears to be increasing as the population is becoming increasingly obese, the incidence of gallstones, the most common cause of acute

pancreatitis, is rising.^{1,2} An increase in the annual incidence for acute pancreatitis has been observed in most recent studies. Prognostic indices are used to predict the severity of the disease process and to guide management, commonly used ones are Ranson, BISAP, APACHE-II and the Balthazar computed tomography severity index.³⁻⁵ Total serum calcium has a place in some of the AP prognostic severity scales.⁶ Individually,

it has been evaluated as a mortality prognostic factor and it has also been evaluated as a predictor of severe AP with infection.⁷⁻⁹ Albumin-corrected calcium (ACC) has also been associated with severity, with the availability of detection of serum calcium and corrected calcium at our institution we took up this study to evaluate these aforementioned serum variables in detecting prognostic severity in acute pancreatitis compared with BISAP score.^{10,11}

METHODS

Cohort Study was done from July 2015 to June 2016 in surgical wards of Govt. Medical College, Kozhikode, Kerala, India. One hundred consecutive patients with acute pancreatitis were selected for the study. All patients admitted with acute pancreatitis of >12 year of age were included in the study.

All patients under 12 years of age, patients whose medical records are incomplete were excluded from the study.

The patients were enrolled using a pre structured performa and questionnaire. Following clinical and demographic data was collected from medical records. Sex, age,, clinical history, serum amylase, serum lipase, total calcium taken 24-hours after admission, serum albumin, BISAP score, USG abdomen, CECT abdomen. All patients with acute pancreatitis who are admitted with in 72 hours of symptoms.

Onset was included in this study. Serum calcium and albumin corrected calcium was measured with in 24 hours of admission. Then patients followed up for a maximum period of 4 weeks and outcomes studied in terms of whether symptoms relieved/patients expired /complications developed such as systemic complications or local complications.

Local complications included acute fluid collection, sterile pancreatic necrosis, infected pancreatic necrosis, pseudo cyst, pancreatic abscess, splenic vein thrombosis etc. Systemic complications included cardiovascular-shock, arrhythmia, pulmonary-ARDS, renal failure, DIC, GIT-ileus, neurological- confusion, visual disturbance, encephalopathy etc. Significance of serum calcium and albumin corrected calcium in predicting outcome of acute pancreatitis was assessed and compared with BISAP score.

Operational definition

Adjusted calcium level = Total calcium + (0.8 x (4 - S. Albumin))

Data obtained was entered and coded in MS-Excel and analysis was carried out using SPSS software and appropriate statistical tests were applied.

RESULTS

According to my study acute pancreatitis most commonly occurs in the age group of 30-50. 80% of acute pancreatitis occurs in male and 20% in female. Alcoholism accounts for 58% cases of acute pancreatitis and gall stone account for 28% of acute pancreatitis.

Out of 100 patients 3 patients expired, 22 patients developed complications such as pancreatic pseudo cyst, pancreatic necrosis, ARF, ARDS, ileus. The remaining 75 patients were completely relieved of the disease without any complication.

Table 1: Distribution of aetiology of pancreatitis.

Type of pancreatitis	Frequency	Percentage
Alcoholism	58	58.0
Gallstones	28	28.0
Others	14	14.0
Total	100	100.0

Table 2: Distribution of S. calcium, S. albumin and ACC in study population (T-Test).

	Outcome	N	Mean	SD
S. calcium	1	25	6.90	0.25
	0	75	7.84	0.37
ACC1	1	25	7.38	0.13
	0	75	7.93	0.31
Total	1	25	2.60	0.76
BISAP	0	75	1.01	0.70

1: Complication; 0: No complication

Table 3: Relationship between hypocalcaemia and outcome.

		Outcome		Total
		0	1	
S. ca CAT	<7.5	Count % within S.ca.CAT 38.5%	24 61.5%	39 100%
	>7.5	Count % within S.ca.CAT 98.4%	1 1.6%	61 100%
Total	Count % within S.ca.CAT	75 75%	25 25%	100 100%

1: Complication; 0: No complication

We measured serum calcium, albumin corrected calcium total BISAP score for every patient. In patients who expired or developed complication, mean calcium value is 6.9and patients without developing any complication mean value was 7.84. In patients who have expired or developed complication, mean adjusted calcium value is 7.38 and patients without developing complication mean value is 7.93. We categorized patients in to those with corrected calcium ≤ 7.5 and those with >7.5 . Out of 39

patients with serum calcium ≤ 7.5 , 24 patients have expired or developed complication. Out of 61 patients with serum calcium >7.5 , only 1 patient developed complication. Specificity of hypocalcaemia (calcium ≤ 7.5) in predicting severity is 80%.

Table 4: Relationship between low ACC and outcome.

			Outcome		Total
			0	1	
ACC CAT	<7.5	Count % within ACC.CAT	8 26.7%	22 73.3%	30 100%
	>7.5	Count % within ACC.CAT	67 95.7%	3 4.3%	70 100%
Total			75 75%	25 25%	100 100%

1: Complication; 0: No complication

Table 5: Relationship between BISAP score and outcome.

			Outcome		Total
			0	1	
BISAP .CAT	<2	Count % within BISAP.CAT	73 85.9%	12 14.1%	85 100%
	>3	Count % within BISAP.CAT	2 13.3%	13 86.7%	15 100%
Total			75 75%	25 25%	100 100%

1: Complication; 0 : No complication

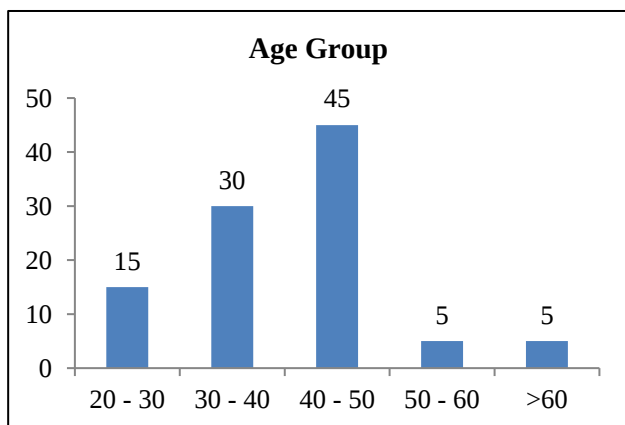


Figure 1: Age distribution of the cases.

Out of 30 patients with adjusted calcium ≤ 7.5 , 22 patients have expired or developed complication. Out of 70 patients with ACC >7.5 , only 3 patients developed complication. Specificity of low ACC (≤ 7.5) in predicting severity is 89%. We also categorised patients in to those with BISAP score ≤ 2 and those with BISAP score ≥ 3 .

Out of 15 patients with BISAP score ≥ 3 , 13 patients have expired or developed complication & out of 85 patients with BISAP score ≤ 2 , 12 patients expired or developed complication. Specificity of high BISAP score (≥ 3) in predicting severity is 97%.

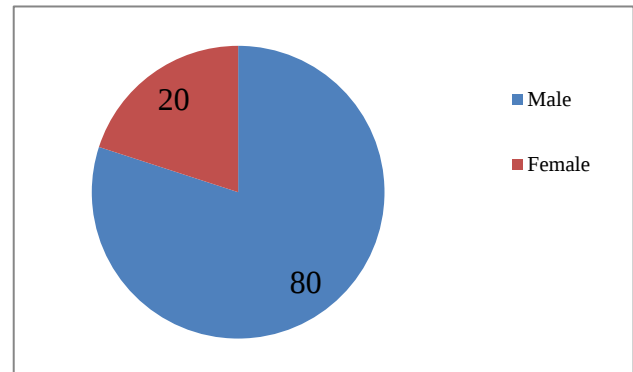


Figure 2: Sex distribution of the patients in the study.

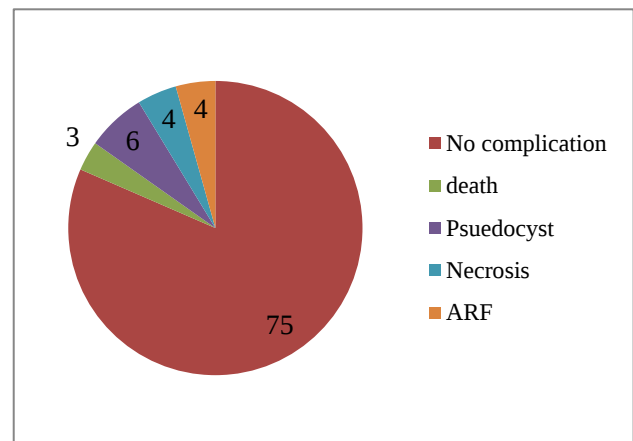


Figure 1: Distribution of complications in the study.

DISCUSSION

According to my study acute pancreatitis most commonly occurs in the age group of 30-50 (Figure 1). Male to female ratio was 4:1 (Figure 2). Alcoholism was the commonest cause and accounted for 58% cases of cases and gall stones accounts for 28% of acute pancreatitis (Table 1), all these findings were similar to study done by Reddy SB et al.¹² Out of 100 patients 3 patients expired, 22 patients developed complications such as pancreatic pseudocyst, pancreatic necrosis, ARF, ARDS, ileus (Figure 3). The remaining 75 patients were completely relieved of disease without developing any complication. Specificity of hypocalcaemia (calcium ≤ 7.5) in predicting severity is 80% in my study was comparable to study done by Jiménez G et al, which shows specificity of 82%.¹³ Specificity of low ACC (≤ 7.5) in predicting severity is 89% again comparable to study done by Jiménez G et al.¹³ Specificity of high BISAP score (≥ 3) in predicting severity is 97%, which in contrast to study done by Chen L et al shows a specificity of 83%.¹⁴

CONCLUSION

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

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Ethical approval: Not required

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