TO STUDY THE INCIDENCE, ETIOLOGY AND CORRELATION BETWEEN SERUM AMYLASE LEVELS AND BALTHAZAR SCORE (SEVERITY) IN PATIENTS OF ACUTE PANCREATITIS AT TERTIARY CARE HOSPITAL

Surgery

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ABSTRACT

Acute pancreatitis is a heterogeneous disease ranging from minimal pancreatic inflammation seen in mild interstitial pancreatitis to extensive pancreatic necrosis and liquefaction of severe attacks.

The incidence of acute pancreatitis is 33.3 per 100,000 population. Maximum number of patients with acute pancreatitis belong to the age groups of 26–35 years and 36–45 years with 34.8% of cases in each of the mentioned age groups. The mean age of presentation was 39 years.

Out of the 89 patients who were diagnosed with pancreatitis, only 5 patients were females while all others were males. The male to female ratio was 16.8: 1 with male preponderance. On presentation, all 89 patients (100%) had pain in abdomen, 89.9% of the cases had vomiting and 64% of the cases had radiating back pain as the presenting symptoms.

Alcohol abuse was found to be the most common cause of pancreatitis isolated in 89.9% of the patients which explains the 16.8:1 male female ratio. The second most common cause was gallstone induced pancreatitis (9%) while idiopathic pancreatitis was found in 1.1% of the cases. None of the patients had other rare causes of pancreatitis amongst the miscellaneous category.

The sensitivity of serum amylase was 84.3% while the specificity of serum amylase was 55.9%. For Balthazar score (inflammation) 1, 2, 3 the mean serum amylase value (U/L) was 696.5, 829.6 and 822.0 respectively. [Normal Range: 22–80U/L in our institute] For Balthazar score (necrosis) 0, 2, 4 the mean serum amylase value (U/L) was 738.1, 57.7 and 43 respectively. [Normal Range: 22–80U/L in our institute]

As the Balthazar score (necrosis) increases, the value of serum amylase remains in the normal limits and does not increase suggesting an inverse correlation between the two.

KEYWORDS

INTRODUCTION

Acute pancreatitis includes a wide spectrum of disease, from mild self-limiting symptoms to a fulminant process with multiple organ failure and high mortality. Acute pancreatitis is an acute inflammatory process of the pancreas that can occur as an isolated event or relapsing episodes. Acute pancreatitis is a heterogeneous disease ranging from minimal pancreatic inflammation seen in mild interstitial pancreatitis to extensive pancreatic necrosis and liquefaction of severe attacks.

Diagnosis is based on the presence at least 2 out of 3 features: abdominal pain; increased pancreatic enzyme amylase, or lipase levels to 3 times the upper limit of normal; and imaging tests showing characteristic findings of acute pancreatitis.^[1]

Given the wide spectrum of the disease seen, the care of the patients with pancreatitis must be highly individualized. Patients with mild acute pancreatitis can generally be managed with resuscitation and supportive care. In contrast, patients with severe and necrotizing pancreatitis may require maximal non-operative care and nutritional support in an intensive care unit.

The two most common causes are alcohol and gallstones, but there are many less common causes.^[1]

There is a positive correlation between serum amylase levels and acute pancreatitis. Patients with unexplained severe upper abdominal symptoms and a normal or only marginally raised serum amylase value require computed tomography in order to determine the presence of pancreatitis.^[2]

Various severity scoring systems are used for assessing the prognosis of acute pancreatitis one of which is the CT Severity Index (CTSI) derived by Balthazar grading of pancreatitis and it serves as the radiological scoring system.

MATERIALS AND METHODS

Source of data:

This is a hospital based observational study that was done in the department of general surgery at tertiary care hospital for a period of 2 years from September 2017–September 2019.

Study group consists of 89 patients, in whom the diagnosis was made clinically by the signs and symptoms of acute pancreatitis, biochemically by determining serum amylase levels and radiologically by ultrasonography and computed tomography (for confirmation).

Method of collection of data:

Patients with signs and symptoms of acute pancreatitis were admitted and then subjected to biochemical investigations like serum amylase levels and for confirmation of the diagnosis, they underwent ultrasonography and computed tomography.

Acute pancreatitis was defined as two or more of the following: characteristic severe epigastric pain, serum amylase or lipase levels three or more times the upper limit of normal and changes consistent with acute pancreatitis on cross-sectional imaging.

Inclusion criteria:

1. Age > 12 years.
2. All patients admitted in the surgery wards at tertiary care hospital with signs and symptoms of acute pancreatitis and those who underwent contrast enhanced CT within two days of admission.

Exclusion criteria:

- 1- Age < 12 years
- 2- Patients admitted with clinical suspicion of acute pancreatitis but did not undergo contrast enhanced CT and were diagnosed to have other causes of acute abdomen.

Statistical Methods:

The inter-group statistical significance of difference of distribution of categorical variables between two groups is tested using Chi-Square test. The inter-group statistical significance of difference of means of continuous variables between two groups is tested using independent sample t test or unpaired t test. The inter-group statistical significance of difference of means of continuous variables across more than two groups is tested using one-way analysis of variance (ANOVA) or F test. The underlying normality assumption was tested before subjecting the study variables to t test, ANOVA and Pearson's correlation analysis. The entire data was entered in MS Excel before its

statistical analysis

In the entire study, the p-values less than 0.05 are considered to be statistically significant. The entire data is statistically analyzed using Statistical Package for Social Sciences (SPSS ver 21.0, IBM Corporation, USA) for MSWindows.

RESULTS

Table 1 : Of 5094 cases who were admitted in the surgery wards between September 2017 to September 2019, 89 cases (1.7%) had acute pancreatitis.

Distribution of etiological factors among the cases with acute pancreatitis (n=89).

Etiology	No. of cases	% of cases
Alcoholic	80	89.9
Gallstone Pancreatitis	8	9.0
Idiopathic	1	1.1
Miscellaneous	0	0.0
Total	200	100.0

Of 89 cases studied with acute pancreatitis, 80 cases (89.9%) had alcoholic, 8 cases (9.0%) had gallstone pancreatitis, 1 case (1.1%) had idiopathic etiology and none had miscellaneous etiology.

All the causes of acute pancreatitis other than alcohol, gall stone and idiopathic were included in the miscellaneous category.

Of 89 cases with acute pancreatitis, the most common CT finding on CT was Bulky enlarged pancreas and Hypodense pancreas which was observed in all 89 cases each (100.0% each), 69 cases (77.5%) had Homogenous enhancement around the pancreas, 17 cases (19.1%) had Heterogeneous enhancement around the pancreas, 17 cases (19.1%) had Necrotic areas in and around the pancreas, 52 cases (58.4%) had Peripancreatic fat stranding, 22 cases (24.7%) had Peripancreatic fluid collections and 8 cases (9.0%) had Gall bladder calculi.

Figure 1: Distribution of CT findings among the cases with acute pancreatitis (n=89).

Of 89 cases studied with acute pancreatitis, 14 cases (15.7%) had normal serum amylase levels and 75 cases (84.3%) had abnormal serum amylase levels.

Sensitivity, Specificity, Positive predictive value, negative predictive value and accuracy of serum amylase (Cut off more than 80U/L) in detecting the incidence of acute pancreatitis is 84.3%, 55.9%, 60.5%, 81.6% and 68.5% respectively.

The normal range of serum amylase levels varies in different institutes.^[3] In our institute, the normal range is 22- 80U/L

Table 2 : Distribution of mean Serum Amylase according to BALTHAZAR Score for Inflammation (n=89).

BALTHAZAR Score (Inflammation)	n	Serum Amylase Levels (U/L)	
		Mean	SD
Score1	19	696.5	135.1
Score2	47	829.6	224.7
Score3	8	822.0	466.3
Score4	15	60.7	15.8
P-value (ANOVA)		0.001*** (Highly-Significant)	

Values are Mean and SD. P-value by analysis of variance- F test. P-

value<0.05 is considered to be statistically significant. ***P-value<0.001 (Highly Significant).

The distribution of mean serum amylase levels differs significantly across various BALTHAZAR Scores for inflammation in group of cases with acute pancreatitis

(P-value<0.001).

Table 3 : Distribution of mean Serum Amylase according to BALTHAZAR Score for Necrosis.

BALTHAZAR Score (Necrosis)	N	Serum Amylase Levels (U/L)	
		Mean	SD
Score 0	81	731.8	312.1
Score 2	6	57.7	13.4
Score 4	2	43.0	7.1
P-value (ANOVA)		0.001*** (Highly-Significant)	

Values are Mean and SD. P-value by analysis of variance- F test. P-value<0.05 is considered to be statistically significant. ***P-value<0.001 (Highly Significant).

The distribution of mean serum amylase levels differs significantly across various BALTHAZAR Scores for Necrosis in group of cases with acute pancreatitis (P-value<0.001).

The mean BALTHAZAR (Inflammation) score is significantly higher among the cases with acute pancreatitis compared to the cases without acute pancreatitis (P-value<0.001).

The mean BALTHAZAR (Necrosis) score is significantly higher among the cases with acute pancreatitis compared to the cases without acute pancreatitis (P-value<0.01).

DISCUSSION

In this study the incidence of acute pancreatitis is 1.7 with 5094 as the total population.

The median age of the onset of acute pancreatitis varies with etiology. The mean age (years) in this study of all 89 patients was – 38.7 + 10.7 years which was comparable with the studies done by Thomas et al,^[4] Jauregui et al,^[5] and others.

In this study, out of 89 patients of acute pancreatitis, 84 patients were male and only 5 were female.

The male to female ratio studied in these 89 cases was 16.8: 1.0

In our study, the commonest cause of acute pancreatitis was alcohol induced as compared to gall stone induced pancreatitis which was the common cause of pancreatitis in other studies.

Gallstone pancreatitis, on the other hand, was seen in only 9% of the cases.

Gall stones were the cause of pancreatitis in all female patients, while only 3 out of 80 male patients had gall stones as the cause of pancreatitis. 1 out of 89 patients was diagnosed to have idiopathic pancreatitis. Miscellaneous causes of pancreatitis listed in a separate category were not seen in any of the patients.

Similar results have been found in the studies carried out by Dugernier T L^[6] and Freeny et al.^[7] On the contrary, studies done by Bollen T L et al^[4] and Jauregui et al^[5] showed biliary stones as the predominant etiological agent.

In this study 84.3% of the radiologically proven positive cases of acute pancreatitis had serum amylase levels more than 80U/L (abnormal) while 15.7% of the radiologically proven negative cases had serum amylase levels within the normal limits. The distribution of serum amylase levels differs significantly between cases with radiologically proven positive acute pancreatitis and radiologically proven negative acute pancreatitis (P-value<0.001).

This suggests a positive correlation between serum amylase levels and acute pancreatitis.

In the study, sensitivity of serum amylase was 84.3% and specificity was 55.9%. This was comparable with the studies carried out by William N Steinberg et al, Winslet et al, John Tracey et al.

Another study conducted by Winslet et al showed that patients with an amylase value

<1000 U/L were more liable to have pancreatic necrosis.^[3] Our study implies the fact that as the Balthazar score for necrosis increases, the serum amylase does not rise, but remains within the normal limits indicating an inverse correlation between serum amylase levels and Balthazar score.

Thus the findings in our study were consistent with those in these two studies.

In our study 74 patients had mild or moderate pancreatitis with evidence of only pancreatic inflammation and peripancreatic fluid collection but no evidence of any pancreatic necrosis on CECT scan. These 74 patients had a raised Balthazar score (inflammation) which was statistically significant. Remaining 15 patients had pancreatic necrosis evident on their CECT scans and these patients had a raised Balthazar score (necrosis) which was statistically significant as well. This shows a positive correlation between Balthazar score and the severity of acute pancreatitis. In this study, 8 patients had severe acute pancreatitis and these 8 patients had evidence of necrosis on CECT scan and showed Balthazar score (necrosis) as 2 or 4. These patients had adverse clinical outcome as compared to the patients having mild or moderate pancreatitis.

Comparable results are seen in study done by Dugernier T L et al,^[6] a study wherein all patients of severe pancreatitis had evidence of necrosis on CECT scan. All the patients with severe pancreatitis and those who had necrosis on CECT scan, had end organ failure which resulted in an adverse clinical outcome. Similar results were shown in a study done by Mole D J et al.^[8] No significant association exists between CTSI (Balthazar) and clinical outcome. Similar results were seen by Balthazar et al^{[9][10][11]} and Lescence et al.^[12]

CONCLUSION

Alcohol was found to be the most common cause of acute pancreatitis in our study, mainly because of alcohol abuse, predominantly seen amongst young individuals in India.

This study confirmed a positive correlation between serum amylase levels and Balthazar score (inflammation), and an inverse correlation between serum amylase levels and Balthazar score (necrosis). Moreover, the results of which, are statistically significant.

REFERENCES

1. Kapil Gupta, MD, MPH; Bechien Wu, MD, MPH. Acute pancreatitis Ann Intern Med. 2010;153(9):ITC5-1
2. Block S, Maier W, Bittner R, Buchler M, Malfertheiner P, Beger HG. Identification of pancreatic necrosis in severe acute pancreatitis: imaging procedure versus clinical staging. Gut 1986; 27:1035-42
3. John Tracey, Anthony Williams, Renz Bais, Krysten Willson, Christopher Worthley, John Reece, Justin Bessell, David Thomas. Evaluation of amylase and lipase in the diagnosis of acute pancreatitis. ANZ Journal of Surgery, 2001, Volume 71, Issue 10, 577-582.
4. Thomas L. Bollen, Vikesh K. Singh, Rie Maurer, Kathryn Repas, Hendrik W. van Es, Peter A. Banks, Koenraad J. Mortele. Comparative Evaluation of the Modified CT Severity Index and CT Severity Index in Assessing Severity of Acute Pancreatitis AJR 2011;197:386-392.
5. Jauregui-Arrieta L, Alvarez-Lopez F, Cobian-Machuca H, Solis-Ugalde J, Torres-Mendoza B, Troyo-Sanroman R. Effectiveness of the modified tomographic severity index in patients with severe acute pancreatitis. Rev Gastroenterol Mex. 2008 Jul-Sep;73(3):144-8.
6. Thierry L Dugernier et al, Compartmentalization of the Inflammatory Response during Acute Pancreatitis Correlation with Local and Systemic Complications. Am J Respir Crit Care, 2003; Med Vol 168:148-157.
7. Freeny PC, Hauptmann E, Althaus SJ, Traverso LW, Sinanan M. Percutaneous CT guided catheter drainage of infected acute necrotizing pancreatitis: techniques and results. AJR Am J Roentgenol. 1998 Apr; 170(4):969-75.
8. Damian J. Mole, Katie L. McClymont, Sarah Lau, Rosamund Mills, Christopher Stamp-Vincent, O. James Garden, Rowan W. Parks. Discrepancy between the Extent of Pancreatic Necrosis and Multiple Organ Failure Score in Severe Acute Pancreatitis. World J Surg (2009) 33:2427-2432.
9. Goldberg PB, Long WB, Oleaga JA. Cholelithiasis as a cause of recurrent pancreatitis. Gastro 1980;78:1041.
10. Balthazar EJ, Robinson DL, Megibow AJ, Ranson JHC. Acute pancreatitis: value of CT in establishing prognosis. Radiology 1990;174:331-336
11. Balthazar EJ, Freeny PC, van Sonnenberg E. Imaging and intervention in acute pancreatitis. Radiology 1994;193:297-306.
12. Lecesne R, Tourel P, Bret PM, et al. Acute pancreatitis: inter observer agreement and correlation of CT and MR Cholangiopancreatography with outcome. Radiology 1999;211:727-735.