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Co-Relation of Severity of Acute Pancreatitis with Serum Amylase, Serum Lipase and CRP Level at Tertiary Care Hospital Ajmer Rajasthan

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Abstract

Background: Acute pancreatitis is a non bacterial inflammation of pancreas caused by, infection interstitial liberation and digestion of the gland by its own enzymes. In the present scenario the early detection of an attack of acute pancreatitis is based on the detection of raised levels of amylase & lipase and serial USG examination for monitoring the inflammatory process and CT scan if indicated.

Methods: This study was a prospective hospital based study with title of "Correlation of severity of acute pancreatitis with serum amylase, lipase, C-reactive protein, USG and CT findings and their comparative study" including 50 cases of acute pancreatitis admitted to various department of J.L.N. Medical College, Ajmer.

Results: In 7 patients with normal amylase levels, 1 patient expired, 2 had recovery with complication, and 4 had complete recovery. The cases with level twice normal were 13 out of which, 1 case died, 4 had recovery with complication and 8 had complete recovery. In patients with a amylase level thrice normal were 30 of which 1 passed away 9 had recovery with complication and 20 had normal recovery. In 3 cases with normal lipase level 1 had recovery with complication and 2 had uneventful recovery. In 15cases with lipase level twice normal 10 has uneventful recovery 4 had recovery with complication and 1 patient expired. Those with level three times the normal were 32, out of which 2 passed away, 10 had complicated recovery and 20 head uneventful recovery. Necrosis was present in 9 patient & Pseudocyst in 4 patients out of 23 patient who had CRP level above 100mg/l.

Conclusion: The serum lipase was a more reliable test as compared to serum amylase in diagnosis of acute

pancreatitis. Increased values of CRP above the significant range correlates positively with the occurrence of necrosis in pancreatitis and can be used to decide on patients who need a CECT as this investigation is expensive and is not widely available.

Keywords: Amylase, Lipase, CRP, Acute pancreatitis.

Introduction

Acute pancreatitis is a non bacterial inflammation of pancreas caused by, infection interstitial liberation and digestion of the gland by its own enzymes. In the present scenario the early detection of an attack of acute pancreatitis is based on the detection of raised levels of amylase & lipase and serial USG examination for monitoring the inflammatory process and CT scan if indicated.[1]

In the last few decades there had been no improvement in the management of this disease. The raised levels of serum amylase levels which in the past were considered diagnostic has proved in the present situation not a very reliable investigation. In 1973, Wohlgemuth et al[1] found that amylase concentration rose during the first 2 to 3 hours after the onset of the acute attack and may persist for days or weeks before returning to normal levels. The increase in serum amylase levels does not correlate reliably with the severity of the disease as small increase in serum amylase level may be seen in acute necrotizing pancreatitis though the patient may have severe disease. In many other diseases like perforation, acute myocardial infarction, ectopic pregnancy, etc serum amylase level may be raised. [2]

The serum levels of lipase concentration tends to rise above the normal level, during acute episodes of pancreatitis and the degree to which it rises follows the level of the rise in serum amylase. The serum lipase values tend to remain elevated for longer duration than serum amylase. Serum lipase is more reliable as pancreas is the only source of lipase.[3]

CRP is an acute phase reactant synthesized by the hepatocytes and is usually elevated in inflammatory conditions. Cytokines like IL-6 are potent inducers of CRP synthesis in liver. It takes nearly 72 hours for the serum level of CRP to peak after the onset of symptoms. It is the most frequently used single biomarker for assessment of severity in Acute Pancreatitis today. This is because it is inexpensive, widely available, and easy to measure. A concentration of more than 150 mg/dL is often accepted as a predictor of severity in Acute Pancreatitis. At this cut-off level, CRP has a sensitivity of 80–86% and specificity of 61–84% for diagnosing necrotizing pancreatitis within first 48 hours of onset of symptoms.

Material & Methods

a) Study design: case control study.

Study setting: J.L.N. Medical College & Associated Group of Hospital, Ajmer, Rajasthan

b) Research objects: all patients who were admitted with clinical diagnosis of acute pancreatitis in various department of J.L.N. Medical College & Associated Group of Hospital, Ajmer, Rajasthan had been taken as subject for this study. C)Study period: cases admitted and treated in various department of J.L.N. Medical College & Associated Group of Hospital, Ajmer, Rajasthan from Jan. 2018 to Dec. 2019.The study was performed on 50 cases.

a. After taking the proper consent, detailed history &clinical examination of these patients will be done by using the questionnaire/proforma

b. They would be subjected to various routine investigations on the day of admission.

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c. Serum amylase and lipase would be done on 1st, 3rd and 7th day of admission.

d. Quantitative assessment of serum CRP would be done using human CRP kit based on the principle of solid-phase enzyme-linked immunosorbent assay after 48 hours of admission and 10th day of admission.

e. Ultrasonography would be done on 2nd day of admission.

f. All those patients, whose CRP was >100mg/l will also be subjected to CT scan.

Inclusion criteria

- All patients with clinical diagnosis of acute pancreatitis.

Exclusion criteria

- Children < 15 years.
- Patient with history of trauma.
- Pregnant & lactating females.
- Chronic pancreatitis.
- Serous cystadenoma.
- Von Hippel-Lindau disease.
- Redo laprotomy.

These patients will be followed up and method of treatment, complications and outcome will be recorded.

Results

Fifty randomised patients with clinical diagnosis of acute pancreatitis admitted in various department of J.L.N. Medical college, Ajmer were investigated. Characteristics of patients undergoing treatment for acute pancreatitis were recorded

The total numbers of patients were 50 out of which 40 were males and 10 were females. The disease was common in young males of age 26-35 years and in elderly females of above 36 years. The disease was common in alcoholics and they accounted for 62% of cases. All the patients were males. The other cause was Cholelithiasis which was present in 28% of cases out of which 71% were male and remaining 29% were females. Idiopathic cause accounted by 28% of cases.

Table 1: Serum Amylase Estimation

Serum Amylase levels	1st day No.of patient	3rd day No.of patient	7th day No.of patient
N(<100U/L)	7(14%)	16(32%)	36(72%)
2N	13(26%)	10(20%)	8(16%)
3N	30(60%)	24(48%)	6(12%)

(N= Normal)

Serial estimation of the serum amylase estimation was done. The amylase levels were normal in 14% cases at admission & were raised two times the normal level in 26% of the cases and three times the normal level in 60% of the cases at the time of the admission. On the third day the level were normal in 32% of the cases, two times the normal value in 20% of the cases and three times the normal value in 48% of the cases. The levels were normal in 72% of the cases, two times normal value in 16% of the cases and three times normal value in 12% of the cases after a week.

Table 2: Serum Amylase and outcome

Serum Amylase levels	Total number	Complete recovery	Recovery with complication	Death
N(<100U/L)	7	4	2	1
2N	13	8	4	1
3N	30	20	9	1

(N= Normal)

In 7 patients with normal amylase levels, 1 patient expired, 2 had recovery with complication, and 4 had complete recovery. The cases with level twice normal were 13 out of which, 1 case died, 4 had recovery with complication and 8 had complete recovery. In patients

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with a amylase level thrice normal were 30 of which 1 passed away 9 had recovery with complication and 20 had normal recovery.

Table 3: Serum Lipase Estimation

Serum Lipase levels	1st day	3rd day	7th day
N(<51)	3(6%)	10(20%)	15(30%)
2N	15(30%)	12(24%)	10(20%)
3N	32(64%)	28(56%)	25(50%)

(N= Normal)

The level of serum lipase were normal in 6% cases, raised two times the normal value in 30% cases and three times the normal values in 64% of the cases at the time of admission. The level were normal in 20% of cases, raised to two times normal value in 24% of the cases and three times the normal value in 56% of the cases on the third day. After a week the levels were normal in 30 % of cases, two times normal value in 20% of the cases and in 50% of the cases the levels were three times the normal value.

Table 4: Serum lipase and outcome

Serum Amylase levels	Total number	Complete recovery	Recovery with complication	Death
N(<51U/L)	3	2	1	0
2N	15	10	4	1
3N	32	20	10	2

(N= Normal)

In 3 cases with normal lipase level 1 had recovery with complication and 2 had uneventful recovery. In 15cases with lipase level twice normal 10 has uneventful recovery 4 had recovery with complication and 1 patient expired. Those with level three times the normal were 32, out of which 2 passed away, 10 had complicated recovery and 20 head uneventful recovery.

Table 5: Serial CRP values distribution at 48 hrs. after admission

CRP value	Male	Female
<6	0	0
6-100	24	3
>100	16	7

CRP values was between 6-100mg/l in 54 % of cases and above 100 mg/l was present in 46 % of cases. No patients had CRP level below 6mg/l.

Table 6: Serial CRP values distribution at 10th day after admission

CRP value	Male	Female
<6	12	4
6-100	15	3
>100	0	0

CRP value on the 10th day of admission of the entire patient could not be done as total 13 patients were discharged before the 10th day and 3 patient expired. In remaining 34 cases 16 patients had CRP value less than 6 mg/L and 18 cases had CRP value more than 6 mg/L after 10th day of admission

Table 7: Complication in patient with high CRP Value (above 100)

Total patient with CRP value above 100	Necrosis	Pseudocyst
23	9	4

Necrosis was present in 9 patient & Pseudocyst in 4 patients out of 23 patient who had CRP level above 100mg/l.

Discussion

In the study the common age of acute pancreatitis was 26-35 years in males and 36 and above in females. This correlates with the data provided by **Russell**[4] 2000 that

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the common age of acute pancreatitis in young males is between 20-40 and in elderly females between 50-60 years.

It was common in females between 50 to 60 years because cholelithiasis is common in females of fifties. In males it was common between 20 to 40 years because of consumption of alcohol.

In this study the level of serum amylase normal in 14% cases two times the normal value in 26% of cases and three times the normal value in 60% of the cases at the time of admission. The levels gradually declined to normal value in 72% cases within one week.

Johnson[5] (1999) said that serum amylase four times normal is indicator of the disease. Norton (2000) concluded that level of amylase more than 3 times normal clinch the diagnosis of acute pancreatitis and they tend to return to normal after one or two weeks. According to **Howard**[6] (1999) the serum amylase concentration rise to more than 2.5 times normal level within 6 hours of the onset of attack and remains elevated for several days. **Steer**[7] **(1999)** said that the elevated serum level of amylase was a very important diagnostic finding and a level rises within the first 12 hours and then often falls to normal within 40-72 hours. **Lankish**[8] (1999) said that acute pancreatitis underestimated and found that patient can also have small increase in serum amylase and lipase level at the time of presentation of acute pancreatitis and concluded that patients with enzyme level less than 3 times normal on admission represented a substantial group that treatment studies have overlooked. **Chase**[9] **(1996)** found that the strong correlation between elevation in serum amylase and lipase levels in both pancreatic and extrapancreatic etiologies of abdominal pain make them redundant measures. **Sternby**[10] **(1996)** found that there is minor difference in sensitivity and specificity of serum amylase for diagnosis acute pancreatitis and non pancreatic disease with hyperamylasemia. **Howard**[11] (2000) reported that the levels of lipase are elevated following an attack of acute pancreatitis and more reliable parameter of acute pancreatitis as pancreas is the main source of lipase. Norton (1998) said that an elevated lipase value is diagnostic of acute pancreatitis and the serum lipase activity increase in parallel with amylase activity measurement of both enzyme increases the diagnostic yield. **Steer**[12] (1998) found that the level of serum lipase are also elevated in cases of acute pancreatitis and they are more specific for pancreatitis. Comfort concluded that the degree to which serum lipase levels rise correlates with the rise of serum amylase levels but their levels remain elevated for longer duration and lipase levels are more reliable as pancreas is the main source of lipase.

In this study, there was an advantage of doing both the tests. 14% of the patients had normal serum amylase. Out of these 6% patient had normal lipase levels and 4% had lipase level two times and 4% had three times to the normal value. 26% of the patients had amylase level two times to normal value and 30% had lipase levels two times the normal value. Thus there was an advantage of doing both the test as the lipase levels were raised in a few cases who had normal amylase levels. The serum lipase is more reliable test as compared to serum amylase in diagnosis of an acute attack of acute pancreatitis.

As given in the literature, most of the therapeutic modalities employed in acute pancreatitis are useful only if instituted before 48 hours and even though CRP level is sensitive in giving the severity of disease, it cannot be considered as a very good indicator in this regard. Significant value CRP level is given as different in multiple studies but, CRP level >100mg/l as given in

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study by Meyer et al, correlates with values obtained in our study and so is taken as significant value for comparison.

In this study, CRP values was between 6-100 mg/l in 54% cases and above 100 mg/l in 46% of cases at 48 hours after admission . It shows 46% cases have severe form of acute pancreatitis all 46% cases CECT was done in which 18% cases show necrosis in and around pancreas. It is important to identify those patients with acute pancreatitis who have an increases risk of dying. Result of our study is similar to the study carried out by **Alfonso et al.**[13] (2003).They conducted a retrospective study on 157 patients of acute pancreatitis whose serum CRP level were determined .Out of 157, 132 patients had high CRP level less than or equal to 200 mg/l obtained at 72 hrs of symptoms onset, is useful for ruling out with a high degree of probability, the presence of necrosis. Similarly **Medicina**[14] (2004) studied the relationship between the CRP level and pancreatitis necrosis. They found that out of 78 patients most of patients had high CRP level cut off of 100 mg/l. In support to our findings **Tariq saeed et al**[15] (2011) said that estimation of the severity state in patients having Acute pancreatitis constitute a significant part of diagnosis and complex treatment so in this diseases early diagnosis and severity can prevent complication and CRP level can early predict the severity of disease. **Del et al.**[16] (2001) suggested that the early diagnosis is mandatory for successful treatment and in acute pancreatitis most widely used scoring systems are often cumbersome and difficult to use in clinical practice because of their multifactorial nature. So the number of unifactorial prognostic indices have been employed in routine hospital practice in which CRP is the one of estimation.

Conclusion

The serum lipase was a more reliable test as compared to serum amylase in diagnosis of acute pancreatitis. Increased values of CRP above the significant range correlates positively with the occurrence of necrosis in pancreatitis and can be used to decide on patients who need a CECT as this investigation is expensive and is not widely available.

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