

## Role of Biochemical Markers in Diagnosis and Prognosis of Pancreatitis and Compared with Healthy Subjects of Rajasthan

Hemlata Sharma<sup>1\*</sup>, Dr. RK Vyas<sup>2</sup>, Shalini vyas<sup>3</sup>

<sup>1</sup>Biochemist, Department of biochemistry. SPMC BIKANER. Rajasthan 334003

<sup>2</sup>Sr.Professor and head, department of biochemistry. SPMC BIKANER. Rajasthan 334003

<sup>3</sup>Biochemist, Department of biochemistry. SPMC BIKANER. Rajasthan 334003

### Original Research Article

#### \*Corresponding author

Hemlata Sharma

#### Article History

Received: 20.11.2018

Accepted: 30.11.2018

Published: 30.12.2018

#### DOI:

10.36348/sjmps.2018.v04i12.002



**Abstract:** Aim of the study was to find out the role of biochemical markers in diagnosis and prognosis of pancreatitis and compared this value with healthy subjects of Rajasthan. Total 200 subjects were selected in which 100 were selected as patients group and 100 were normal healthy subjects. Out of 100 patients 75 patients were male and 25 patients were female. patients were distributed age wise .Most of the male patients were alcohol abused And suffering from abdominal pain and most of the female patients suffering from gall stone and abdominal pain. Trypsin was estimated with sandwich Elisa kit method and other biochemical parameters were performed by commercially available kit on fully auto analyzer. In male patients of age group 15-55 years Mean serum total and direct bilirubin level was  $7.49 \pm 3.86$  and  $3.46 \pm 1.81$  respectively. AST level was  $268.22 \pm 71.74$  and in control group mean AST level was  $28.69 \pm 5.85$ . P-value was found highly significant. ( $P \leq 0.0001$ ) .as well as serum alkaline phosphatase level was found  $779.86 \pm 456.77$  and in control group mean ALP level in serum was  $107.0 \pm 15.34$  IU/L. mean value of amylase and lipase  $486.86 \pm 154.20$  and  $2040 \pm 745.85$  respectively. Mean serum level of trypsin was  $461.16 \pm 200.72$ . in female patients all these parameters were also increased. We conclude that all biochemical parameters are increased in pancreatitis. Serum amylase and lipase both increases in pancreatitis but lipase is a specific test for alcohol induced or alcoholic pancreatitis. Trypsin can be used as a marker of pancreatitis.

**Keywords:** Pancreatitis, sandwich Elisa, Bilirubin, AST, ALT, Trypsin.

## INTRODUCTION

Digestive enzymes which are secreted by pancreas are present in inactive condition until they reach the intestine. Whenever the inflammation occur in pancreas the enzymes of pancreas become active and attack the tissue which produce the enzyme are get damaged. Pancreatitis occurs in two forms either acute or chronic. It may be serious and can lead to much type of complications or health problems. Which leads to bleeding, tissue damage, and organ failure? Pancreatitis mostly found in men than women [1]. Alcohol is most common cause in men and gallstone is occur more often in women [2, 3]. The diagnosis of acute pancreatitis is done by the help of raised level of serum amylase more than three times the upper limit of normal value. This enzyme activity rises after the onset of symptoms and within the first 12 hours and return to normal range within 3 to 5 days [4]. Serum lipase activity remains increased for longer up to 8 to 14 days when compared with serum amylase. So it gives more sensitivity in patients with delayed presentation .as the pancreatic lipase activity are 4 times that of amylase, they are least effected by chronic insufficiency of pancreas [5]. The

level of total bilirubin more than 2.38 mg/dl, and age of patient is older than 70 years and GGT level of serum is greater than 250 IU/L and serum level of ALP is more than 225 IU/L associated with CBD [6]. Chronic pancreatitis found in patients who are between the age 30-40 years Heavy alcohol use is the most common cause of chronic pancreatitis. On acute attack that damages the pancreatic duct, triggers the chronic form of pancreatitis- pancreas get inflamed by damaged duct [7].

## MATERIALS AND METHODS

The present study was conducted in 200 subjects (age between 15-75 years) in surgery and gastroenterology department of PBM hospital. 100 subjects was pancreatitis suspected or diagnosed clinically by radiological findings and suffering from abdominal pain. Severity of disease was calculated by glassgow criteria and 100 normal persons were selected as control group.

Blood collected in a clean and dry test tube. Allow samples to clot for 2 hours at room temperature

before centrifugation. Collect the supernatant and carried out the assay immediately. Serum bilirubin, AST, ALT, ALP and amylase and lipase was performed with the help of commercially available kits on fully automated machine and trypsin was estimated by kit based on sandwich enzyme linked immunosorbent assay technology.

### Design of Study a Case-control analytical study

#### Setting

This study was carried out at Department of Biochemistry, Department of Biochemistry in collaboration with the Department of General surgery and gastroenterology at S.P. Medical College and Associated group of P.B.M. Hospitals, Bikaner. All participants completed a medical history form and provided informed consent.

#### Study Population

Study was included 200 subjects. 100 were study group and 100 were control group. These patients suffering from abdominal pain and pancreatitis suspected or clinically diagnosed (with radiological findings) pancreatitis patients.in group 2<sup>nd</sup> patients with gallstone with abdominal pain and pancreatitis suspected or clinically diagnosed (with radiological findings) was selected. In this study 75% patients was male and 25% was female. Patients were distributed age wise.

In 15-55 years age group 36 male was selected as patients and only 6 was female and in 56-75 years age group 39 patients was male and 19 were female.

42% patients were between 15-55 years and 58% patients were between 56-75 years.

#### Study Period & Study Approval

Present study was done from June 2016 to June 2018. The Institutional Ethical Committee at the Sardar Patel Medical College and Associated Group of P.B.M. Hospitals, Bikaner, Rajasthan, India, approved the study. The Developmental Research Committee at the Rajasthan University of Health Sciences, Jaipur, India, was also approved the study.

#### Study Protocol

The following criteria are undertaken for the selection of the patients in the study:-

#### Inclusion Criteria

Depends according to Atlanta symposium 1992.patients with abdominal pain, and having gallstone or alcoholic age between 15-75 and having clear radiological findings of abdomen were included.

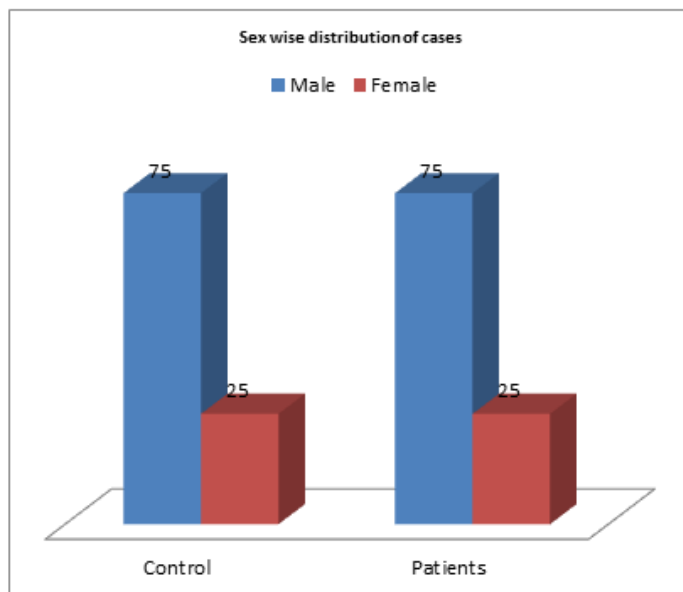
#### Exclusion Criteria

Serious ill patients severe hepatic or renal disease, Cancer, Severe psychiatric disorder (e.g. schizophrenia), Stroke, Pregnant women, autoimmune diseases, Familial hyperlipidemia with a Patients with the history of any other complicated disease were excluded. Patients with history of any surgery case which could have an impact on pancreatic function were excluded. Chronic smokers were excluded.

### OBSERVATION TABLES

**Table-1: Sex wise distribution of cases**

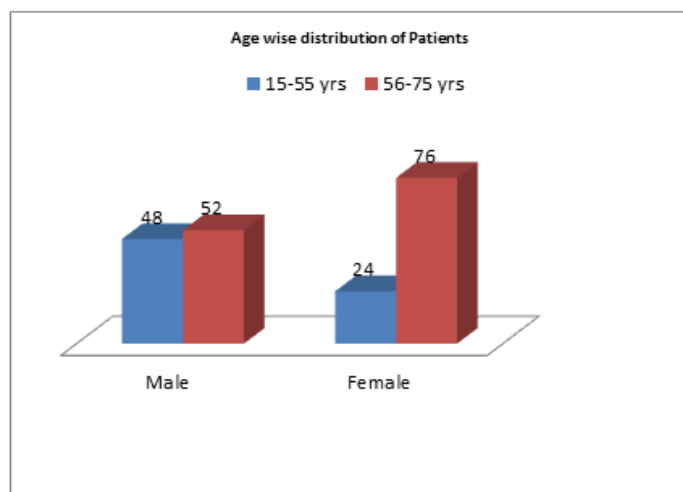
Gender	Control (n=100)	Patients (n=100)
Male	75 (75%)	75 (75%)
Female	25 (25%)	25 (25%)
Total	100	100



**Fig-1**

**Table-2: Age wise distribution of Patients**

Age (years)	Male	Female	Total
15-55	36 (48%)	6 (24%)	42 (42%)
56-75	39 (52%)	19 (76%)	58 (58%)
Total	75	25	100



**Fig-2**

**Table-3: Age wise distribution of controls**

Age (years)	Male	Female	Total
15-55	36 (48%)	6 (24%)	42 (42%)
56-75	39 (52%)	19 (76%)	58 (58%)
Total	75	25	100

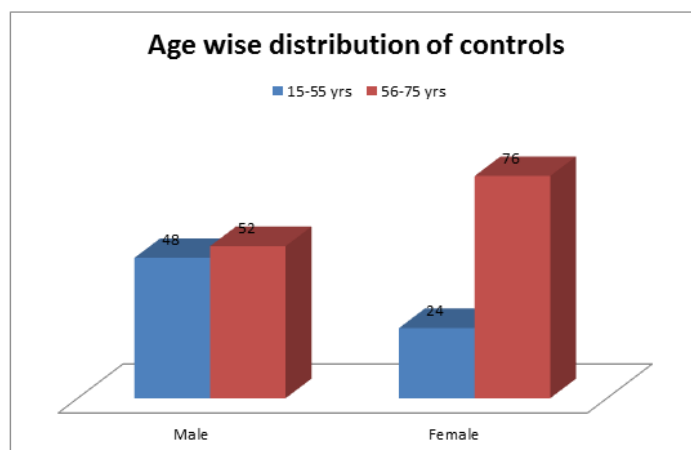


Fig-3

Table-4: Comparison of male group (age 15-55)

Parameters	Patients (n=36)	Controls (n=36)	P value
Bilirubin Total	7.49 ± 3.86	0.875 ± 0.22	0.001
Bilirubin Direct	3.46 ± 1.81	0.255 ± 0.07	0.001
AST	268.22 ± 71.74	28.69 ± 5.85	0.0001
ALT	326.55 ± 83.13	36.27 ± 6.97	0.0001
Alkaline phosphatase	779.86 ± 456.77	124.47 ± 38.19	0.0001
Amylase	486.86 ± 154.20	84.16 ± 10.67	0.0001
Lipase	2040.50 ± 745.85	93.19 ± 25.02	0.0001
Trypsin	461.16 ± 200.72	188.58 ± 27.81	0.0001

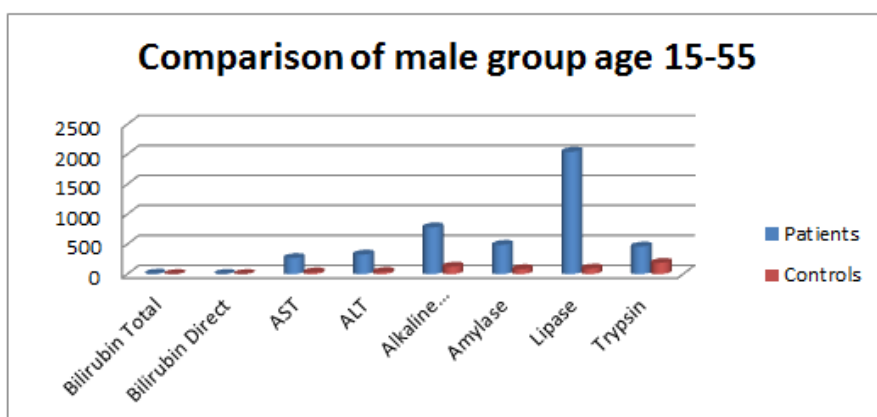


Fig-4

Table-5: Comparison of female group age 15-55

Parameters	Patients (n=6)	Controls (n=6)	P value
Bilirubin Total	5.0 ± 3.95	0.82 ± 0.17	0.001
Bilirubin Direct	2.53 ± 1.89	0.26 ± 0.05	0.001
AST	270.16 ± 62.22	26.33 ± 5.88	0.0001
ALT	262.0 ± 90.76	35.66 ± 6.12	0.0001
Alkaline phosphatase	648.66 ± 208.19	107.0 ± 15.34	0.0001
Amylase	914.16 ± 238.74	81.50 ± 10.46	0.0001
Lipase	1260.33 ± 631.75	76.83 ± 15.74	0.0001
Trypsin	445.50 ± 184.44	215.0 ± 54.01	0.0001

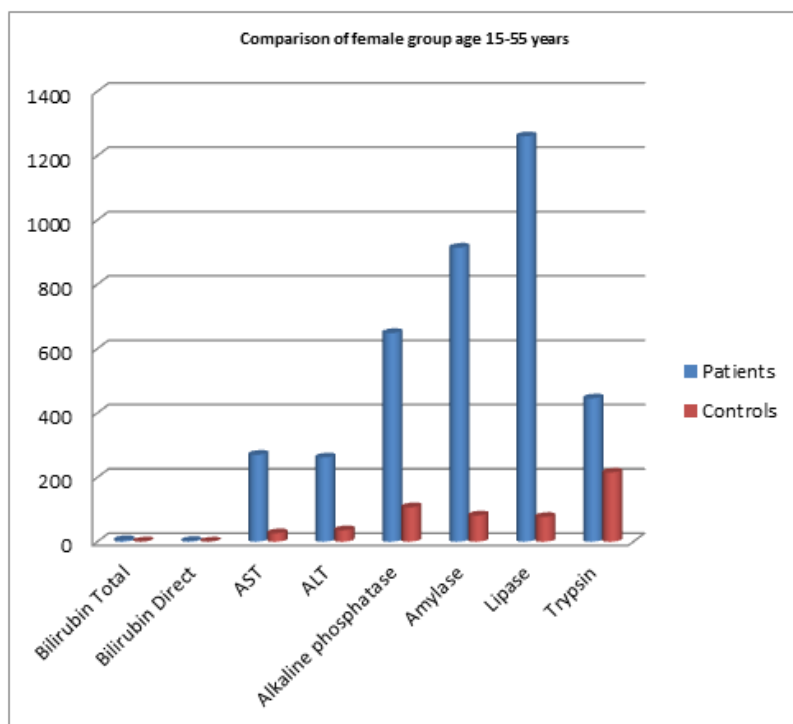


Fig-5

Table-6: Comparison of Alcoholic patients and Control group

Parameters	Alcoholic patients (n= 75)	Control Group (n=100)	P value
Bilirubin Total	7.36 ± 3.71	0.94 ± 0.25	0.0001
Bilirubin Direct	3.02 ± 1.82	0.28 ± 0.08	0.0001
AST	260.96 ± 70.79	29.83 ± 6.54	0.0001
ALT	323.72 ± 89.51	37.94 ± 8.54	0.0001
Alkaline phosphatase	768.22 ± 422.09	122.38 ± 33.26	0.0001
Amylase	504.34 ± 199.00	84.43 ± 11.95	0.0001
Lipase	2100.16 ± 809.18	98.86 ± 30.70	0.0001
Trypsin	588.49 ± 254.70	191.26 ± 35.07	0.0001

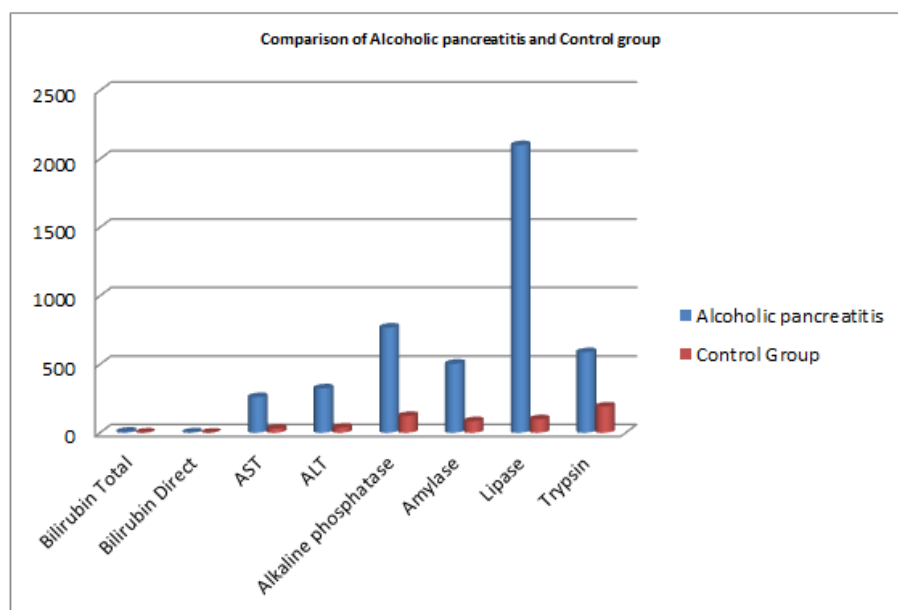


Fig-6

## RESULT S

Table no 1,2,3 showing age and sex wise distribution of patients and control subjects. And in table no. 4 comparison of biochemical parameters was done in patients and control group (age group 15-55 years) .serum bilirubin was found increased in patients in our study. Mean serum total and direct bilirubin level was  $7.49 \pm 3.86$  and  $3.46 \pm 1.81$  respectively. as well as in control group mean serum total and direct bilirubin level was found  $0.875 \pm 0.22$  and  $0.25 \pm 0.07$ . P-value was found to be significant when compared with healthy subjects. ( $P \leq 0.001$ ) AST value was increased in patients. Mean AST level was  $268.22 \pm 71.74$  and in control group mean AST level was  $28.69 \pm 5.85$ . P-value was found highly significant. ( $P \leq 0.0001$ ) .as well as ALT level was also increased in patients group. We found that mean ALT level was  $326.55 \pm 83.13$  in patients and in control group mean ALT level was  $36.27 \pm 6.97$  observed. P-value was statistically highly significant when compared with healthy subjects ( $P \leq 0.0001$ ). when alkaline phosphatase level was measured in patients and control group the level of ALP was significantly increased in patients group .mean level of serum ALP was  $124.47 \pm 38.19$  and in control group mean serum ALP level was  $124.47 \pm 38.19$ . P value was found to be highly significant ( $P \leq 0.0001$ ). serum amylase and lipase was also increased in patients c. and in control group this value was found  $84.16 \pm 10.6 \pm$  and  $93.19 \pm 25.02$ . serum amylase and lipase level observed highly significant (P-value 0.0001) serum trypsin level was found to be increased in patients and mean serum level of trypsin was  $461.16 \pm 200.72$  and in control group this value was calculated  $188.58 \pm 27.81$ . value was found to be highly significant . $P \leq 0.0001$  observed.

In table no 5 female patients group of same age these value was observed elevated. Comparison of

female patients and female control group was done. Serum bilirubin was increased in patients. Mean serum total and direct bilirubin was found  $5.0 \pm 3.95$  and  $2.53 \pm 1.39$  respectively. and in control group mean total and direct bilirubin was  $0.82 \pm 0.17$  and  $0.26 \pm 0.05$  mg/dl. This value was statistically highly significant and P value was less than 0.0001. serum AST level was found increased in all patients .mean serum AST level was found  $270.16 \pm 62.22$  and in control group the value was  $26.33 \pm 5.88$  this value was highly significant when compared with healthy subjects and P-value was less than 0.0001. as well serum ALT level was found increased in our study mean ALT level was  $262.0 \pm 90.76$  and in control group this value was  $35.66 \pm 6.12$ . The P value was highly significant ( $P \leq 0.0001$ ). and statistically highly significant  $P \leq 0.0001$  observed in our study. Serum amylase and lipase were observed elevated in both conditions patients having gallstone or alcoholic. Mean amylase and lipase was  $914.16 \pm 238.74$  and  $1260.33 \pm 631.75$  respectively. And in control group this value was  $81.50 \pm 10.46$  and  $76.83 \pm 15.34$  respectively. P value was highly significant. ( $p \leq 0.0001$ ). serum trypsin was found increased in all patients in this study .mean trypsin level was  $445.50 \pm 184.42$  as well as in control group mean level of trypsin was  $215.0 \pm 54.01$ . result was highly significant ( $P \leq 0.0001$ ).

As table no 6 shows in alcoholic patients mean total and direct bilirubin level was found  $7.36 \pm 3.71$  and  $3.02 \pm 1.82$  and in control group this value was in normal range  $0.94 \pm 0.25$  and  $0.28 \pm 0.008$ . the P-value was highly significant when compared with healthy subjects. AST and ALT Level was also increased in alcoholic patients . Mean serum AST and ALT level in patients was  $260.96 \pm 70.79$  and  $323.72 \pm 89.51$  and in control group  $29.83 \pm 6.54$  and  $37.94 \pm 8.54$ . P-value

was statistically highly significant. ( $P \leq 0.0001$ ) Alkaline phosphatase was increased in alcoholic patients mean ALP of patients was  $768.22 \pm 422.09$ . and in control group this value was  $122.38 \pm 33.26$ . so P value was highly significant  $P \leq 0.0001$ . Amylase and lipase level was increased in alcoholic patients. Mean value of amylase and lipase was  $504.34 \pm 199.00$  and  $2100 \pm 809.18$  and in control group mean serum amylase and lipase was  $84.43 \pm 11.95$  and  $98.86 \pm 30.70$  so P-value was highly significant  $0.0001$ . like all biochemical markers serum trypsin level was also increased in alcoholic patients group. mean serum trypsin level in patients was  $588.49 \pm 254.70$  and in control group serum level of trypsin was  $191.26 \pm 35.07$ . this value was also highly significant when compared with healthy subjects of rajasthan ( $P \leq 0.0001$ ).

## DISCUSSION

In our study serum level of biochemical parameters was increased in all patients with abdominal pain and who was clinically diagnosed with radiological techniques or pancreatitis suspected. Total and direct bilirubin in male patients with age 15-55 years was increased more than female group of patients with same age. And when compared with healthy subjects both female and male patients group had higher value of bilirubin. Serum AST and ALT level was also increased in male and female patients. But in control group this value was in normal range. Markedly increased level of serum ALP was found in male patients than female patients. But when compared with healthy subjects this value was increased in both male and female patients group. Serum amylase level was increased in both group of patients but in female patients amylase level was more than serum amylase level in male patients. As well as lipase level was increased in both patients group either male or female. But in male patients serum lipase level was more than serum lipase level in female patients. And in control group this value was in normal range. When compared with healthy subject's serum trypsin level was increased in both groups' female patients and male patient's. normal trypsin level was found in control group. Moss Berg *et al.* proposed 3 mechanism to explain the liver enzymes elevation after obstructive process. 1) regurgitation of transaminases from clogged biliary canaliculi to liver sinusoids. 2) increased production of the enzymes and 3) secretion of transaminases by hepatocytes in response to increased intrabiliary pressure.<sup>[8]</sup> the present study noted that lipase enzyme is selective for the diagnosis of acute pancreatitis because this enzyme is specific for pancreas, increased levels of amylase enzyme activity at least 3 times in tests should be more than maximum amount of its normal to be able to distinguish acute pancreatitis.<sup>[9,10]</sup> The current British Society of Gastroenterology guidelines for the management of acute pancreatitis suggest that clinical presentation with elevation of plasma concentration of pancreatic enzymes, preferably lipase levels, is the cornerstone of

diagnosis<sup>[11]</sup>. Various studies have demonstrated that serum lipase levels have better sensitivity and specificity compared to serum amylase levels in diagnosing pancreatitis [12, 13]. Both amylase and lipase are released from acinar cells during acute pancreatitis, and their concentration in the serum is used to confirm diagnosis [14]. However, the diagnosis of pancreatitis should not solely be based on the arbitrary value of three or four times greater than normal of pancreatic enzymes, but interpreted together with the clinical presentation [15] our study supports to the study of Tourney *et al.* shows the alcoholic etiology of acute pancreatitis according to result of several biochemical parameters<sup>[16]</sup>. In addition, serum lipase is more sensitive in terms of detecting the presence of acute alcohol-induced pancreatitis. The present study demonstrated that raised lipase levels were seen in 95–100% of patients depending on aetiology [17]. in our study biochemical markers was found increased which was closely associated with study of Van Gossum *et al.* they described that increased biochemical parameters (transaminases, ALP, Bilirubin level amylase) with abdominal pain was suspected clinically as acute pancreatitis<sup>[18]</sup>. our study supports the study of moolla Z *et al.* who describe that alcoholic pancreatitis was more common in men and patients having gallstone had greater serum amylase activity and ALT activity. In gallstone more than double activity of normal ranges of enzyme ALT and Amylase found in gall stone pancreatitis [19]. In all patients serum trypsin level was found increased. During acute pancreatitis trypsin is released in to circulation but it is effectively inactivated by serum protease inhibitors. Serum trypsin concentration was markedly raised in all patients. The level of immunoreactive trypsin remained elevated for longer period. Than those of urinary amylase consequently phospholipase and trypsin are released to the circulation during hemorrhagic pancreatitis [20].

## CONCLUSION

We conclude that all biochemical parameters are increased in pancreatitis. Increase serum amylase in female shows it is good marker for gallstone pancreatitis. Elevation in serum lipase shows the alcoholic origin of pancreatitis. So in alcoholic patients serum lipase is a good marker for diagnosis of pancreatitis. Serum level of AST, ALT and ALP also increases in pancreatitis. Serum trypsin level increased in all patients so can be a good marker for diagnosis and prognosis of pancreatitis.

## REFERENCES

1. Russo, M. W., Wei, J. T., Thiny, M. T., Gangarosa, L. M., Brown, A., Ringel, Y., ... & Sandler, R. S. (2004). Digestive and liver diseases statistics, 2004. *Gastroenterology*, 126(5), 1448-1453.
2. Lankisch, P. G., Assmus, C., Lehnick, D., Maisonneuve, P., & Lowenfels, A. B. (2001).

- Acute pancreatitis: does gender matter?. *Digestive diseases and sciences*, 46(11), 2470-2474.
3. Dufour, M. C., & Adamson, M. D. (2003). The epidemiology of alcohol-induced pancreatitis. *Pancreas*, 27 (4), 286-290.
  4. Smotkin, J., & Tenner, S. (2002). Laboratory diagnostic tests in acute pancreatitis. *Journal of clinical gastroenterology*, 34(4), 459-462.
  5. Tietz, N. W., & Shuey, D. F. (1993). Lipase in serum--the elusive enzyme: an overview. *Clinical chemistry*, 39(5), 746-756.
  6. Neoptolemos, J. P., London, N., Bailey, I., Shaw, D., Carr-Locke, D. L., Fossard, D. P., & Moossa, A. R. (1986). The role of clinical and biochemical criteria and endoscopic retrograde cholangiopancreatography in the urgent diagnosis of common bile duct stones in acute pancreatitis. *Surgery*, 100(4), 732-742.
  7. Russo, M. W., Wei, J. T., Thiny, M. T., Gangarosa, L. M., Brown, A., Ringel, Y., ... & Sandler, R. S. (2004). Digestive and liver diseases statistics, 2004. *Gastroenterology*, 126(5), 1448-1453.
  8. Mossberg, S. M., & Ross, G. (1963). High serum transaminase activity associated with extrahepatic biliary disease. A clinical and pathologic study of sixty patients with serum glutamic-oxalacetic transaminase levels of 300 units or greater. *Gastroenterology*, 45, 345-353.
  9. Ewald, N., & Kloer, H. U. (2009). Severe hypertriglyceridemia: an indication for apheresis?. *Atherosclerosis Supplements*, 10(5), 49-52.
  10. Yeh, J. H., Chen, J. H., & Chiu, H. C. (2003). Plasmapheresis for hyperlipidemic pancreatitis. *Journal of Clinical Apheresis: The Official Journal of the American Society for Apheresis*, 18(4), 181-185.
  11. UK working party on acute pancreatitis. (2005). UK guidelines for the management of acute pancreatitis. *Gut*; 54(Suppl 3):iii1-9.
  12. Agarwal, N., Pitchumoni, C. S., & Sivaprasad, A. V. (1990). Evaluating tests for acute pancreatitis. *American Journal of Gastroenterology*, 85(4).
  13. Thomson, H. J., Obekpa, P. O., Smith, A. N., & Brydon, W. G. (1987). Diagnosis of acute pancreatitis: a proposed sequence of biochemical investigations. *Scandinavian journal of gastroenterology*, 22(6), 719-724.
  14. Matull, W. R., Pereira, S. P., & O'donohue, J. W. (2006). Biochemical markers of acute pancreatitis. *Journal of clinical pathology*, 59(4), 340-344.
  15. Toouli, J., Brooke-Smith, M., Bassi, C., Carr-Locke, D., Telford, J., Freeny, P., ... & Tandon, R. (2002). Guidelines for the management of acute pancreatitis. *Journal of gastroenterology and hepatology*, 17, S15-S39.
  16. Tourné, I., Viedma, J. A., & Pérez-Mateo, M. (1997). Biochemical model of logistic regression for early prediction of the etiology of acute pancreatitis. *Revista espanola de enfermedades digestivas: organo oficial de la Sociedad Espanola de Patologia Digestiva*, 89(12), 885-896.
  17. Gumaste, V., Dave, P., & Sereny, G. (1992). Serum lipase: a better test to diagnose acute alcoholic pancreatitis. *The American journal of medicine*, 92(3), 239-242.
  18. Van Gossum, A., Seferian, V., Rodzynek, J. J., Wettendorff, P., Cremer, M., & Delcourt, A. (1984). Early detection of biliary pancreatitis. *Digestive diseases and sciences*, 29(2), 97-101.
  19. Moolla, Z., Anderson, F., & Thomson, S. R. (2013). Use of amylase and alanine transaminase to predict acute gallstone pancreatitis in a population with high HIV prevalence. *World journal of surgery*, 37(1), 156-161.
  20. Mero, M., Schröder, T., Tenhunen, R., & Lempinen, M. (1982). Serum phospholipase A2, immunoreactive trypsin, and trypsin inhibitors during human acute pancreatitis. *Scandinavian journal of gastroenterology*, 17(3), 413-416.