STUDIES ON SERUM AMYLASES IN CARCINOMA OF LIVER, BILIARY TRACT AND PANCREAS


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ABSTRACT

Total amylase activity, its isoenzymes and pancreatic to salivary ratio were studied in 33 healthy subjects and 52 patients with hepatobiliary and pancreatic malignancies of which 12 were with hepatocellular carcinoma, 12 with liver metastases, 9 with carcinoma of gall bladder, 6 with obstructive jaundice, 7 with periampullary carcinoma and 6 cases with carcinoma of pancreas.

Total amylase was found to be elevated in carcinoma of pancreas and periampullary carcinoma compared to normal whereas in obstructive jaundice the values were decreased significantly (p<0.001). P (Pancreatic) fraction was found to be elevated significantly in all except in carcinoma of pancreas and obstructive jaundice. S (Salivary) fraction was decreased significantly in all except in carcinoma of pancreas. P/S ratio was elevated in hepatocellular carcinoma, obstructive jaundice, metastatic liver disease, gall bladder carcinoma and periampullary carcinoma (p<0.001) but in carcinoma of pancreas P/S ratio was low as compared to normal.

This simple test of total serum amylase, P fraction and S fraction, P/S ratio can be utilised in differentiating various hepatobiliary and pancreatic malignancies.

KEY WORDS : Serum amylases, Carcinoma, Liver, Biliary tract, Pancreas

INTRODUCTION

The serum amylase activity, the principal laboratory index for acute pancreatitis rises in a variety of clinical conditions involving the pancreas, liver, genitourinary tract and lungs (1-4). It is known to increase in diabetic ketoacidosis (5) and ectopic pregnancy (6). Fractionation of amylase into various isoenzymes has permitted identification of the tissue of origin using a process of gel separation, chromatography or isoelectric focussing.

Our study on the levels of total serum amylase and its isoenzymes in testicular tumors had shown that total serum amylase remained normal but P/S ratio and pancreatic fraction (P) were elevated significantly in patients with testicular tumors (7). In patients with renal insufficiency due to benign or malignant conditions total amylase activity, its pancreatic and salivary fraction were elevated whereas P/S ratio remained normal (8).

The clinical features and biochemical parameters are known to overlap in majority of hepatobiliary and pancreatic malignancies. Amylase and its isoenzymes have been studied in a variety of liver diseases (9). Hyperamylasemia has been found in chronic active hepatitis (HBV induced), however, there are no reports utilising amylase and its isoenzymes in various hepatobiliary and pancreatic malignancies.

The purpose of this study was to measure total serum amylase, pancreatic and salivary frac-
MATERIALS AND METHODS

The material for this study comprised of 33 healthy ambulant subjects and 52 cases with hepatobiliary and pancreatic malignancies-twelve patients with hepatocellular carcinoma, 12 with liver metastasis, 6 with obstructive jaundice, 7 with periampullary carcinoma, 9 with carcinoma of gall bladder and 6 with carcinoma of pancreas.

All 7 patients with periampullary carcinoma had obstructive jaundice with bilirubin ranging from 3.85-43.0 mg% (median = 14.69 mg%). Two patients with liver metastasis had bilirubin levels of 2.57 mg% and 5.21 mg%. Five patients with carcinoma of gall bladder had elevated bilirubin levels ranging from 3.45-22.55 mg% (median=11.15 mg%). Amongst 6 patients with obstructive jaundice 4 had porta nodes whereas two had bile duct tumor. The bilirubin level ranged from 17.03-25.28 mg% (median=20.8 mg%).

All cases studied had histological evidence of malignancy and belonged to an age group of 25-60 years. Age and sex distributions were similar between controls and study groups. All had normal renal function. Blood samples were allowed to clot at room temperature, centrifuged at 10,000 rpm for half an hour and the separated sera were analysed on the same day. Haemolysed samples were excluded. Quality control sera were run during analysis to check precision and accuracy of each estimation.

Amylase activity was determined by the method of Satomura et al (10) and ratio of pancreatic to salivary amylase was determined by the inhibition method of O'Donnell (11) on a fully selective random access analyser Hitachi 705. Standard P/S curve was plotted using Pharmacia isoamylase standards and inhibitors.

Students 't' test for unpaired numbers was used for statistical analysis after confirming homogeneity of variances. Cochrans correction was utilised in a group with heterogenous variance.

RESULTS AND DISCUSSION

On comparing the mean levels of serum bilirubin, total serum amylase, P/S ratio, P and S fractions of normals with patients of hepatobiliary malignancies it was found that the levels of total serum amylase were nearly normal but the increase in P/S ratio and P fraction and decrease in S fraction were highly significant (Table 1).

In metastatic liver disease the levels of total serum amylase were the same as those in normals but in hepatocellular carcinoma and carcinoma of gall bladder the mean levels of total serum amylase were decreased insignificantly whereas in obstructive jaundice the decrease in total serum amylase levels were highly significant (p<0.001).

The elevation in P fraction was found to be significant in all the types except in carcinoma of pancreas and obstructive jaundice. The decrease in S fraction was significant in cases of hepatocellular carcinoma, obstructive jaundice, carcinoma of gall bladder, periampullary carcinoma and metastatic liver disease, whereas in carcinoma of pancreas S fraction was elevated insignificantly as compared to normal.

The P/S ratio was significantly elevated in all cases of hepatobiliary malignancies (p<0.001) but in carcinoma of pancreas this ratio was found to decrease. This decrease in P/S ratio could be due to increase in S fraction or suppression of P fraction.

Table 2 gives a comparison between normals and jaundiced and non-jaundiced patients with hepatobiliary malignancy. The total serum amylase in jaundiced and non-jaundiced groups did not show any significant change, whereas the P, S and the P/S ratio were found to be significantly elevated in both the groups as compared to normals (p<0.001). Thus bilirubin cannot be the cause of an elevated level of P/S ratio.

Table 3 gives the frequency of elevation of total serum amylase, P/S ratio, P and S fractions. In 12 cases with hepatocellular carcinoma total serum amylase, P and S fraction were not elevated in any of the cases studied while P/S ratio was elevated in 10 of the 12 cases (83.33%). The elevation was 2.6 times.

In 12 cases with metastatic liver disease total serum amylase was elevated in one out of 12 cases.