Short Communication

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Serum amylase or serum lipase, a comparison in acute pancreatitis

Akut pankreatitte bir karşılaştırma, serum amilaz veya serum lipaz

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Abstract

Background: More and more samples are received by the laboratories each day for the simultaneous measurement of serum amylase and lipase in the diagnosis of acute pancreatitis.

Objectives: This study is an effort to find which of the two analytes, serum amylase or lipase, is a better marker.

Methods: This is a retrospective study from a tertiary care hospital in which radiologically diagnosed patients of acute pancreatitis, in whom blood samples for the estimation of serum amylase and lipase were collected within 12–72 h after the onset of abdominal pain were taken up for the study. All the relevant data and imaging details were collected.

Results: We analyzed 100 such cases and in our study we found that 74 out of 100 patients had raised serum amylase and 93 out of 100 had raised serum lipase levels.

Conclusion: In rural health care centers, in smaller hospitals, or in set ups where resources are limited and in situations where patients cannot afford, serum lipase will be a better choice over serum amylase in the diagnosis of acute pancreatitis.

Keywords: Acute pancreatitis; Lipase; Amylase; Correlation; India.

Özet

Arka plan: Akut pankreatitin teşhisinde serum amilaz ve lipazın eşzamanlı ölçümü için her gün laboratuvarlara daha fazla numune gelmektedir.

Amaç: Bu çalışma, iki analitten (serum amilaz veya lipazdan) hangisinin daha iyi bir marker olduğunu araştırmayı amaçlamaktadır.

Yöntemler: Bu, radyolojik olarak tanı alan akut pankreatit hastalarında, karın ağrısı başlangıcından 12–72 saat sonra serum amilaz ve lipaz tayini için kan örneklerinin alındığı, üçüncü basamak sağlık kuruluşunda yapılan retrospektif bir çalışmadır. İlgili tüm veri ve görüntüleme detayları toplanmıştır.

Bulgular: Bu çalışmada, incelenen 100 hastanın 74'ünde serum amilazı, 93'ünde ise serum lipaz düzeyleri yükselmiştir.

Sonuç: Kırsal sağlık ocaklarında, küçük hastanelerde veya kaynakların sınırlı olduğu yerlerde ve hastaların maddi durumları elvermediğinde, serum lipaz ölçümleri akut pankreatit tanısında serum amilaz ölçümlerinden daha iyi bir seçim olacaktır.

Anahtar Kelimeler: Akut pankreatit; Lipaz; Amilaz; Korelasyon; Hindistan.

Introduction

Acute pancreatitis (AP), which usually presents with acute abdomen, is a very common GI disorder. With the rise in the number of hospital admissions for AP [1], the economical burden of this disease is huge [2]. The diagnosis of acute pancreatitis depends on the presence of two of the following three criteria, abdominal pain characteristic of AP, serum amylase or serum lipase or both elevated three times or more than the upper limit of normal and characteristic findings of AP on contrast-enhanced computed tomography (CECT) or magnetic resonance imaging (MRI) [3].

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Acute pancreatic pain is usually epigastric and usually radiates to the back, but could also be felt in the upper right or left quadrant of the abdomen, or could be felt in the flanks or chest. The intensity of the pain is usually constant but could be variable and in most of the cases is usually severe. Sometimes the pain could be masked or absent, because of organ dysfunction or the history of pain may not be available in cases of elderly or in patients with dementia. To make a diagnosis in such circumstances we are left with two options, raised serum levels of amylase and/or lipase or both and imaging studies of the abdomen. CECT abdomen is usually considered the gold standard for the diagnosis of acute pancreatitis, but could be normal in early presentation or the patient may not afford it. So we are left with only one choice that is raised serum levels of amylase or lipase or both.

Most of the hospital labs usually perform simultaneous measurement of both serum amylase and lipase and we want to know whether both are really needed or a single marker is enough to make a diagnosis. Most of the present day health care facilities are well equipped to perform both the tests but sometimes the smaller hospitals or the far off rural health centers may not have adequate facilities or it may become a burden on the patient or the care providers to do both of these simultaneously. This study compares the use of serum amylase and serum lipase as a diagnostic marker in acute pancreatitis.

As a laboratory test amylase was used for the first time in 1919 long before lipase was used [4]. During an attack of acute pancreatitis serum levels of amylase start rising by 6–24 h, peaks at 48 h and usually by 5–7 days tend to normalize [4, 5]. On the other hand lipase starts to rise within 4–6 h, peaks at 24 h and tend to normalize within 8–14 days after the onset of an acute attack of pancreatitis [6, 7]. Half-life of lipase is higher than that of amylase, so it remains active for a longer time [7]. The sensitivity of serum amylase in some studies was found to be 81–95% when it was compared with radiologically confirmed cases of acute pancreatitis with the help of a CT abdomen or a USG abdomen [8]. In one study serum amylase levels were found normal in about 19% of patients who were otherwise proven cases of acute pancreatitis by CECT abdomen [9].

The sensitivity of serum lipase also varies and in one study it was found to be between 85 and 100% [10]. Some studies have shown it to be as an inferior marker and some have shown it as a better marker in acute pancreatitis [11, 12]. Lots of studies have been done which show serum lipase as a better marker than serum amylase in the diagnosis of acute pancreatitis [11, 13]. It is also mentioned in the guidelines by the British Society of Gastroenterology that serum lipase is a better marker than serum amylase in

the diagnosis of acute pancreatitis [14]. Non-specific rise in serum lipase is found in as many conditions as the rise in serum amylase thus decreasing its specificity [15]. The aim of our study is similar as to which of the two markers is better in the management of acute pancreatitis.

Materials and methods

It is a retrospective study at a tertiary care hospital between January 2016 and July 2017, in which we analyzed serum amylase and lipase levels of 100 patients who were radiologically proven cases of acute pancreatitis. Only those patients were included in the study who had presented within 72 h after the onset of abdominal pain and the blood samples were taken within 12–72 h after the onset of abdominal pain. All the relevant data including imaging studies were collected. All the biochemical analytes were estimated on the VITROS 5600 integrated system (Ortho Clinical Diagnostics, Illkirch Cedex, France).

Amylase is an amylolytic digestive enzyme produced by the exocrine pancreas and salivary glands and its levels are increased in a host of conditions including acute pancreatitis [16]. Principle of the procedure: the amylase in the sample converts dyed starch substrate into smaller dyed saccharides. The reflection density of the dyed saccharides is measured by reflectance spectrophotometry at 2.3 and 5 min. The difference in the slide's reflection density between the two readings is proportional to sample amylase activity. The incubation time of the reaction is 5 min at 37°C, 10 µL of sample is required and the reaction is read at a wavelength of 540 nm. The reference range of serum amylase with this method is 30–110 U/L [17].

Lipase is a digestive enzyme that is mainly produced by the acinar cells of the exocrine pancreas and its levels are increased in as many conditions as serum amylase including acute pancreatitis [16].

Principle of the procedure: The lipase in the sample converts water insoluble triacylglycerol ester, a substrate through a series of steps into a colored dye. The resulting change in reflection density is measured at 2 time points. The difference in reflection density is proportional to the activity of lipase present in the sample. The incubation time of the reaction is 5 min at 37°C, 5.5 µL of sample is required and the reaction is read at a wavelength of 540 nm. The reference range of serum lipase with this method is 23–300 U/L [18].

Data was analyzed by SPSS version 15. An initial frequency count of all variables was done. Correlation between levels of amylase and lipase were compared using the Pearson correlation variable.

Figure 1: The positive correlation of serum amylase and lipase level. The value of sample correlation coefficient (r) was 0.447.

the median age of 39 years (interquartile range 18). The cut off value for both serum amylase and serum lipase was taken as 3 times the upper limit of normal according to the guidelines established for the diagnosis of acute pancreatitis. There was a positive correlation ($r = 0.447$) among the serum amylase and serum lipase (Figure 1). In our study, 74 patients out of 100 had raised serum amylase levels meaning a sensitivity of 74% (Figure 2), and 93 patients out of 100 had raised serum lipase levels meaning a sensitivity of 93% (Figure 3). In 22 patients who had normal serum amylase levels, serum lipase was elevated and in the seven patients who had normal serum lipase levels, serum amylase was raised which means one of the two analytes was raised in all of the cases. In some cases, serum amylase (12%) and lipase levels (30%) had gone as high as 10 times the upper limit of normal.

Results

Hundred radiologically diagnosed cases of acute pancreatitis irrespective of etiology were taken up for the study. Out of 100 cases, 76 were male and 24 were female with

Discussion

As a diagnostic marker of acute pancreatitis serum amylase became available much earlier and after serum lipase became available, serum amylase continued to

Figure 2: The levels of serum amylase among 100 radiologically diagnosed cases of acute pancreatitis.

Figure 3: The levels of serum lipase among 100 radiologically diagnosed cases of acute pancreatitis.

be used because it had the advantage of being inexpensive and readily available, as compared to lipase assays which was not only inconvenient to use but also costly to measure [4]. In the present times, lipase assays are easily available and are as affordable, fast, simple and valid as serum amylase levels are. Previous works in the same area have shown that using serum amylase and serum lipase together does not increase their diagnostic precision [19]. A retrospective study done by Corsetti et al. [20] showed that there is no added advantage in performing both the assays together than doing serum lipase alone. Some of the disadvantages of serum amylase as compared to serum lipase assays are slightly lesser specificity, shorter half-life and hence lesser sensitivity in patients who present late, lesser sensitivity in alcoholic pancreatitis and in hypertriglyceridemia. The cornerstone of diagnosis of acute pancreatitis should be raised pancreatic enzyme levels preferably lipase levels with typical clinical presentation, according to the current British Society of Gastroenterology guidelines [14]. A sensitivity of 85–100% and specificity of 84.9–99% in the diagnosis of acute pancreatitis was found in one study done by Apple et al. [11]. A study showed a sensitivity of serum amylase between 95 and 100% but a poor specificity of 70%, done by Agarwal et al. [13]. A higher sensitivity and specificity of serum lipase was reported by Thomson et al. [12]. Our study showed a sensitivity of 78% for serum amylase and a sensitivity of 93% for serum lipase and we could not comment on the specificity. Our study is in agreement with majority of the studies which revealed a higher sensitivity and specificity of serum lipase as compared to amylase in the management of acute pancreatitis.

Conclusion

In smaller hospitals where limited lab and radiological facilities are available, measurement of serum lipase concentrations alone is sufficient to diagnose patients with pancreatitis and substantial save the cost of addition test.

Conflict of interest: The authors have no conflict of interest for this manuscript.

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