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Prevalence of Acute Pancreatitis and Hyperamylasemia in Acute Organophosphorus poisoning in Kashmir valley (North India)

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Abstract

Organophosphorus poisoning is soaring due to easy availability in rural settings of developing countries. There are many reports of Acute Pancreatitis associated with OP poisoningand a casual relationship has been demonstrated in animal models. This study was therefore designed to determine the prevalence of hyperamylasemia and acute pancreatitis in organophospate poisoning in our setup and to reduce mortality and hospital stay by its early detection. This is a cross sectional hospital based study carried out in SKIMS Medical College, Srinagar, J&K which is tertiary care facility. All patients included were above 18 years of age with a recent history of organophosphate ingestion, cutaneous absorption or inhalation with clinical signs and symptoms of organophosphate poisoning. Confounding factors like drugs causing pancreatitis, ERCP within 24 hrs, previous history of pancreatitis, cholelithiasis and or any other local pathology were excluded. Serum Amylase and Lipase were measured. Imaging like ultrasonography and CT scan Abdomen was ordered. BISAP scoring was used to assess severity of acute pancreatitis. 50 patients with ingestion of organophosphates were evaluated. 23 patients developed abdominal pain, among which 11 patients had hyperamylasemia while 7 developed Clinical acute pancreatitis with high lipase and imaging findings. 2/3 of patients who developed pancreatitis had mild severity while other 1/3 had severe severity. Pancreatitis in Organophosphorus is not uncommon and needs high clinical suspicion for early diagnosis and management.

Keywords: Acute Pancreatitis, Hyperamylasemia, Organophosphorus Poisoning.

Introduction

Incidence of organophosphorus poisoning is soaring due to easy availability in rural settings of developing countries where its use as pesticide is quite high[1]. Worldwide 3 million people are exposed each year with 300000 deaths attributed to them[2,3]. Organophosphates common in use are parathion, malathion, fenthion, diazianon, chlorpyrifos while carbamates are methomyl and aldicarb. Nerve agents like sarin, tabun, and soman

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are organophosphorus compounds. There are many reports of Acute pancreatitis associated with OP Poisoning[4-7]. And a causal relationship has been demonstrated in animal models[8]. Cholinergic stimulation of the pancreas and the Sphincter of Oddi (SO) results in both increased pancreatic secretion and increased SO activity in animal models. It has been shown that excessive cholinergic stimulation using an acetelcholine agonist can result in acute pancreatitis. Organophosphate used as an insecticide irreversibly inhibits cholinesterase resulting in delayed breakdown of synaptic acetylcholine and has been noted to cause acute pancreatitis in humans. In animal models organophosphates results in acute pancreatitis associated with raised pancreatic duct pressure. This is thought to be secondary to "obstruction" at the SO level coupled with cholinergic stimulation of pancreatic secretion. This study was therefore designed to determine the prevalence of hyperamylasemia and acute pancreatitis in Organophosphate poisoning in our setup and to reduce mortality and hospital stay by its early detection.

Materials and Methods

This is a cross sectional hospital based study carried out in SKIMS MEDICAL College, Srinagar, Jammu and Kashmir which is tertiary care facility catering for acute and sub-acute emergencies. The study was conducted over a period of 2 years from November 2017 to October 2019. A total of 50 patients (41 females and 9 males) of acute poisoning with organophosphate insecticide were studied. All patients including both sexes and ages above 18 years with a recent history of Organophosphate ingestion, cutaneous absorption or organophosphate poisoning were included in the study. Confirmation of the poison was done by seeing the container brought bought by the patient's family members and composition printed over them. Those patients with history of ingestion of any other material along with organophosphates, who were addicted to alcohol or had a history of gallstones or gallstones seen on ultrasound or any other history of gastric ulcer or burning epigastric pain in past were excluded from the study. Also those who had gone through ERCP (endoscopic retrograde cholangiopancreatography) in previous 24 hours or had a positive history of drug intake like azathioprine, mercaptopurine, asparginase, valporic acid, pentamidine, estrogens etc. were not included in the study.

Serum amylase and lipase levels were measured with a Hitachi-911 autoanalyser via enzymatic and colorimetric assay. Serum amylase levels between 0 and 96 U/L and serum lipase levels between 0 and 60U/L were accepted as normal. Any two of the following criteria were used to diagnose acute pancreatitis: typical abdominal pain, threefold or greater elevation in serum amylase and/or lipase level, and/or confirmatory findings on cross-sectional abdominal imaging. All patients diagnosed to have acute pancreatitis also underwent an ultrasonographic study (by experienced radiologists) and computerized tomography, if necessary. Also the serum levels of Bilirubin, SGPT, SGOT, LDH, CPK, creatinine, Blood urea nitrogen, lipid profile and leukocytes counts were measured.

Data Collection Procedure: A special Proforma was designed to enter all the collected data containing the basic information about the patient, history of recent event and the past history, physical examination and lab investigations including complete blood count, random blood sugar, alanine aminotransferase (ALT), lactate dehydrogenase, serum amylase and lipase, ultrasonography abdomen and Computed Tomography Abdomen.

Data Analysis: The collected data was analyzed statistically using SPSS version-10 on computer.

Descriptive statistics like frequency and percentage of qualitative variables like sex, history , presenting complaints, clinical findings and causes of pancreatitis including gallstones, alcohol addiction, drug intake etc and quantitative variables like age, weight, amount of pesticide ingestion, time of ingestion and stomach wash.

Results

During period of study 50 patients with ingestion of organophosphates were evaluated. 45 among 50 patients intended to commit suicide (90.0%), whereas 05 patients, (10.0%) were exposed to organophosphates due to accidental event. None

came with a homicidal attempt. All 50 patients (100.0%) were exposed to organophosphates through gastrointestinal route, none via inhalation or cutaneous absorption. Among 50 patients, sex distribution showed 41 patients (82.0%) were females and 9 patients (18.0%) were males. Male to female ration was 0.23:1 . Among 41 females 39 (96%) had intended suicidal attempt. 02 female (4%) gave statement of accidental intake of organophosphates. Among 09 males, 07 (77.78%) males were exposed to organophosphates as suicidal attempt and 02(22.22%) were accidental. Mean age at presentation was 22.5 years. The youngest was 18 years old whereas the oldest was 80 years. Through the 2 year period, 11 of 50 patients (22%) were found to have hyperamylasemia among whom 7 patients (14.0%) had more than threefold elevated amylase levels. Highest level of serum amylase was 1035 U/L. SGPT was elevated in 3(6.0%) patients. Among the patients with normal amylase levels, isolated elevated leucocyte count was noted in 6 patients (12.0%) isolated raised LDH was found in 2 patients (4.0%) raised CPK seen in (2.0%) patient and raised SGPT was seen in 0 patients (0.0%). Among 50 patients , the most common clinical presentation was excessive salivation seen in 42 (84.0%) of patients while vomiting was seen in 23 (46.0%) of patients. Abdominal pain was seen in 23 patients (46.0%) out of these 11 had hyperamylasemia and 7 had acute pancreatitis proven by concomitant raised lipase levels and ultrasound findings. Confusion and drowsiness was noted in 30 patients (60.0%). One patient of pancreatitis (2%) had developed necrosis on CT Scan.

The frequently observed clinical findings among 50 patients with a positive history of ingestion of organophosphates were constructed pupils seen in 43 patients (86.0%). Fasciculations were noted in 23 patients (46.0%). Chest crepitations were heard in 20 patients (40.0%). Convulsions were seen in 2 (4.0%). Mild Acute Pancreatitis with BISAP score of 0-1 was seen in 5 (10%) patients while severe acute pancreatitis with BISAP score of >=3 was seen in 2 (4.0%) patients. Pancreatic necrosis on CT Scan was seen in only 1 patient(2%). No patient died during the study.

Table 1: Biochemical markers in organophosphorus poisoning patients, patients Pancreatitis vs patients without pancreatitis

	Mean TLC (.10X10 3/Mmm3)	**Mean SGOT** (U/L)	**Mean SGPT** (U/L)	**Mean AlP** (U/L)	**Mean Amylase** (U/L)	**Mean Lipase** (U/L)	Mean LDH (U/L)	**Mean Bilirubin** (mg/dL)	**Mean BUN** (mg/dL)	**Mean Creatinine** (mg/dL)
All patients	7.6	24	22	101	132	78	149	0.82	18	0.71
Pancreatitis Patients	9.6	41	47	193	547	211	137	1.13	22.5	0.93

SGPT- serum glutamic-pyruvic transaminase,
SGOT- serum glutamic-oxaloacetate transaminase,
LDH-Serum Lactate Dehydrogenase,
ALP- Alkaline phosphate,
TLC- Total Leucocyte count,
BUN-Blood urea nitrogen

Discussion

Cases with acute pancreatitis as a complication of organophosphate exposure have been reported in the literature[9]. Ahmed Arshia et. al.[10] conducted a descriptive study at the Medicine Department, Abbasi Shaheed Hospital Karachi during the period of six months from 16th June 2003 to December 2006. All patients of both sexes and ages above 15 years admitted with a positive history of organophosphate poisoning (OP) were included in the study. Among 90 patients, hyperamylasemia was found in 28(31%) patients. Hyperlipasemia was seen in nine (10%) patients and pancreatitis was seen in two (202%) patients. Concluded that hyperamylasemia is more frequently seen in organophosphate poisoning while two patients proved to have acute pancreatitis as a complication. S Singh et al[11] carried out a prospective study in PGIMER, Chandigarh, India between June 2001-June 2005, to find the incidence of hyperamylasemia and acute pancreatitis in patients with OP poisoning. Of the 79 patients studied ,

serum amylase was found to be elevated (> 200 S.U) in 37 patients (46.95%), among them in three patients it was 800 S.U. One of them showed swollen pancreas on ultrasonography which was confirmed by Computerized Tomography. In other two patients, evidence of pancreatitis was not observed. There was no significant correlation between the nature of compounds (OP or carbamates), duration and severity of cholinergic syndrome and increase in serum Amylase. It has been concluded that mild elevation of serum Amylase is common in patients with OP poisoning, however acute pancreatitis is rare. ISahin et. al.[12] conducted a prospective study in the Department of Internal Medicine, University of Yuzuncu Yil, Medical faculty, Van, Turkey in 2002, to find the prevalence of pancreatitis in OP poisoning. Four of the total 47 patients with acute OP poisoning had obviously elevated Amylase and Lipase levels (Amylase>300 U/L ; Lipase >60 U/L). Only two of the patients with Amylase levels between 100 and 300 U/L had elevated levels of Lipase. None of the patients with normal Amylase levels had elevated levels of Lipase. A total of 12. 76% were diagnosed as acute pancreatitis. It was concluded that acute pancreatitis is not a rare complication of organophosphorus poisoning. In order to improve the outcome of OP poisoning early diagnosis of acute pancreatitis is important and serum Amylase and Lipase levels should be routinely considered carefully. W C Lee et. al.[13] carried out a retrospective study of medical records of 121 patients with the diagnosis of OP poisoning over three years in Veterans General Hospital, National Yang-Ming University in 1998. Serum amylase, pancreatic amylase, salivary amylase, lipase and cholinesterase levels and the clinical manifestations were analyzed. It was observed that 44 patients (36%) had hyperamylasemia (Amylase>360 U/L). Lipase was measured in 28 patients with hyperamylasemia; nine of 28 had hyperlipasemia (Lipase >380 U/L). The finding of hyperamylasemia was closely related to clinical severity and presence of shock. It was concluded that hyperamylasemia is frequent in severe OP Poisoning. However, hyperamylasemia is not synonymous with acute pancreatitis and pancreatic amylase is not reliable parameter in the diagnosis of organophosphate induced pancreatitis due to its low sensitivity and specificity. Lipase assay is indicated in patients with hyperamylasemia for early diagnosis of pancreatitis. N. Matsumiya et. al.[14] performed a retrospective study of OP poison in intensive care unit of analyze the incidence of respiratory failure in Department of Anesthesiology 7 Critical care medicine, Kyodo General Hospital, Ibaraki, Japan in 1996. Of the 32 OP poisoning patients, 16 developed respiratory failure and received ventilator support. An increase in plasma amylase above the normal range was found in patients who developed respiratory failure. Chatruvedi et. al.[15] in their 2013 one year study, 30 of 96 patients (31.25%) were found to have hyperamylasemia. 16 patients (16.67%) had more than threefold elevated amylase levels. Among 13 patients (10%) out of 30 with hyperamylasemia had elevated lipase levels, 6 had >3Xuln lipase levels with diagnosis of pancreatitis.

However in our study, we observed frequent hyperamylasemia in 22.0% which is lower as observed in other studies. We found that elevation of serum amylase is common in patients with pesticide poisoning. However, acute pancreatitis is also not uncommon. However, acute pancreatitis is also not uncommon. We have also observed elevation in the serum levels of SGPT, LDH, CPK and TLC in most patients showing raised amylase and lipase. Limitation of our study was that serum cholinesterase levels were not done on admission because of non availability of test in our hospital lab.

Conclusion

Acute pancreatitis and hyperamylasemia are not uncommon in organophosphate poisoning. Diagnosis of acute pancreatitis should be given importance and appropriate treatment as clinically indicated and can be life-saving.

Conflict of Interest Statement: The authors declare that there is no conflict of interest related to the contents of this article

Source of Funding: None, all investigations were done in hospital as admitted patient and were part of routine and baseline work-up.

Ethical Clearance: Was not needed as it was an analytical study which is exempted from ethical clearance as there was no financial or ethical issue involved in this analytical(retrospective) study.

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