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A Study of the Differences in Age, Gender and Outcome in Patients with Alcohol Induced Acute Pancreatitis vs Non Alcohol Induced Acute Pancreatitis

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Abstract: ***Background: Study is aimed to investigate the differences in age, gender and outcome in patients with alcohol induced acute pancreatitis vs non alcohol induced pancreatitis. Study was done in a tertiary level teaching hospital in Kerala, India. Methods: A cross sectional study was conducted in the department of general surgery, Govt. Medical College, Kozhikode. 128 patients who were admitted with acute pancreatitis were part of the study. Questionnaires were administered to the patient and their bystanders on the day of admission and on the day of discharge or on day 7, whichever was earlier. Results: Out of the 128 patients, 105 were male and 23 were female. 69 patients out of 128 had alcohol induced pancreatitis (54.4%) and all of them were male, none were female. 4 out of the 6 patients who had died had alcohol induced pancreatitis. Conclusion: Among all etiologies for acute pancreatitis, Alcohol was the most common cause for acute pancreatitis among our study participants. Males are at a higher risk of pancreatitis than females. No significant increased risk of severity noted when comparing the outcomes between alcohol and non alcohol induced pancreatitis.***

Keywords: Acute pancreatitis, Alcohol induced pancreatitis, gall stone induced pancreatitis

1. Introduction

Acute pancreatitis is due to a sudden inflammation of the pancreas . It's often caused by gallstones which obstruct the pancreatic duct outflow or due to alcohol intake. Other causes include drugs intake, trauma, genetic factors, scorpion bites, etc. Diagnosis is made based on clinical features, a high serum amylase and lipase (more than 3X normal value or higher) and/or characteristic radiological features. Most patients have a mild illness which will resolve with minimal supportive care. A few patients, however, will have a severe course of illness associated with multiple organ failure. Severe cases carry a significant risk of mortality. There can be local and/ or systemic complications. Common local complications include pancreatic necrosis, fluid collection, and pseudocysts. Systemic complications are Acute Respiratory distress syndrome, multiple organ dysfunction, shock, etc. Many scoring systems have been introduced to for grading the severity of acute pancreatitis. Treatment involves supportive care with IV fluids, analgesics and early initiation of enteral nutrition once symptoms subside. Prophylactic antibiotics are usually not given. Presence of complications will need specific interventions. The causative factor will also have to be managed to prevent recurrence. Endoscopy and cholecystectomy may be indicated if there is a biliary cause.

2. Methodology

- **Type of study:** A cross sectional study was conducted in the Department Of General Surgery, Government Medical College, Kozhikode.
- **Study Population:** The study population consisted of patients who were admitted in the department of surgery for acute pancreatitis (Definition: presence of any two of the following as per ACG guidelines: acute abdominal pain/ elevated S Amylase and S Lipase levels/ Features of acute pancreatitis on radiological imaging.) A total of 128 patients were included. The study was conducted from October 2022 to January 2023.
- **Inclusions and exclusions:** Criteria for inclusion in the study were- Age >/= 13 years. Exclusion criteria were- 1) Multiple etiological factors present, 2) If the patient had pre existing chronic pancreatitis.
- **Data collection:** Data was collected using a questionnaire that was administered by the author to the patient - on the day of admission and on the day of discharge or on the 7th day of admission. All patients in the study had a CECT abdomen scan on 2nd or 3rd of admission.
- **Study tools used:** Proforma, Laboratory investigations, Chest X-Ray, CECT abdomen report
- **Variables under study:** Age, Sex, MCTSI Score, Blood urea nitrogen, GCS, Presence of SIRS, Presence of pleural effusion and Outcome.
- **Data Analysis:** Data analysed and plotted with Epi Info Version 7.2 and Python version 3.8 with pandas, matplotlib, seaborn and sci-kit learn libraries on google collaborator.

3. Results

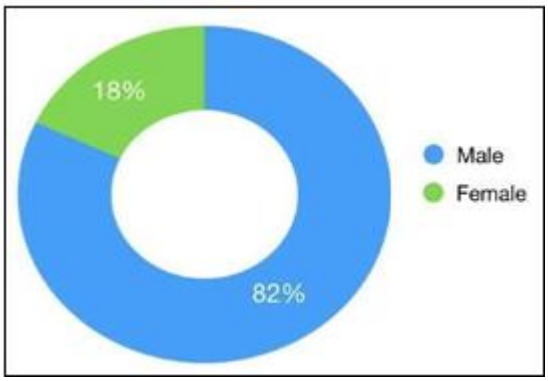


Figure 1: 105 patients were male (82%) and 23 were female (18%) out of the 128 patients.

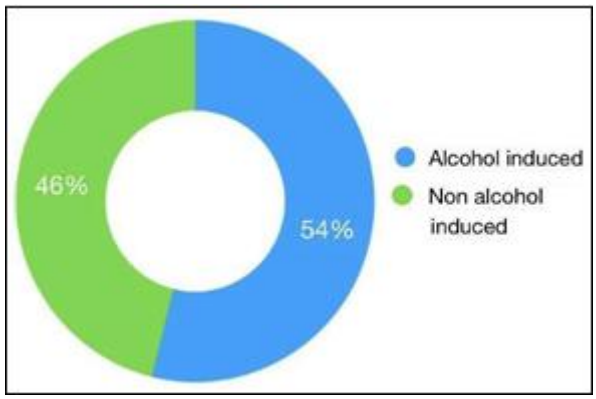


Figure 2: 69(54%) out of the 128 cases were attributed to alcohol consumption and 59(46%) were not associated with alcohol

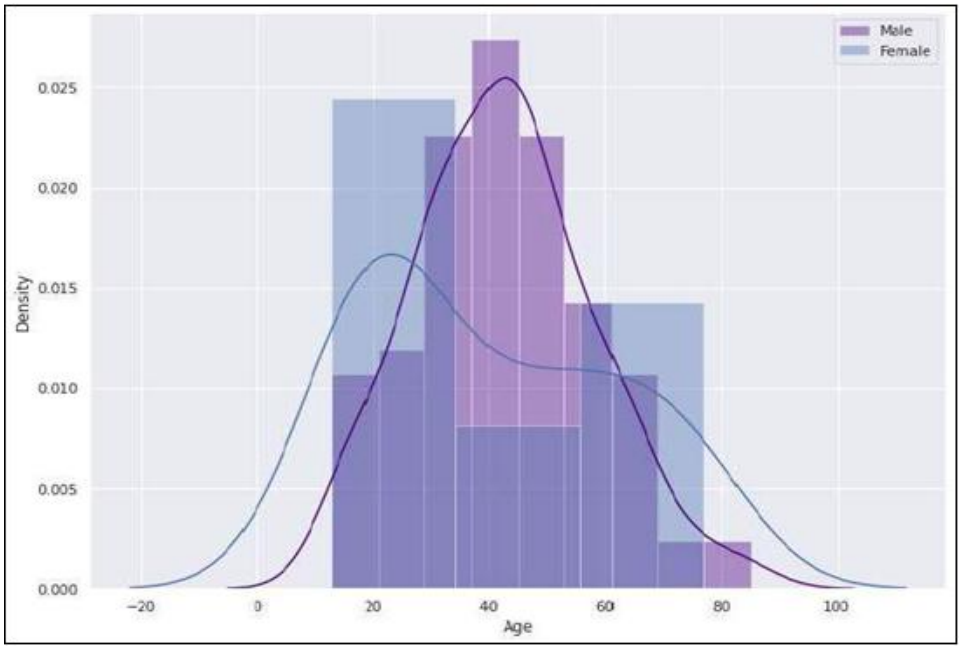
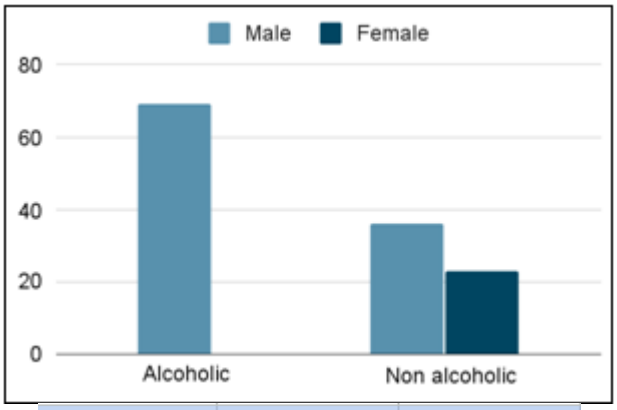
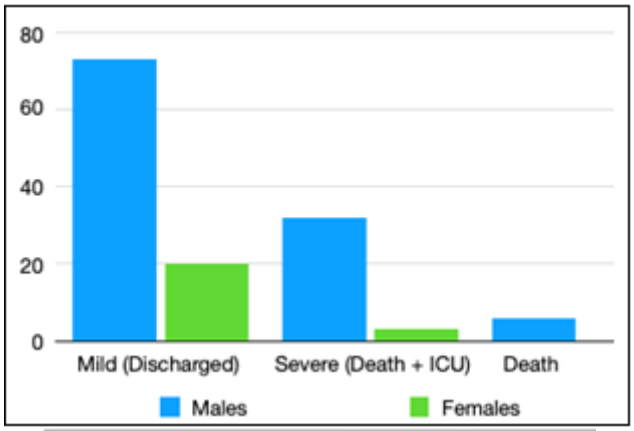


Figure 3: The age and gender distribution density plot. Middle aged men in the 5th decade of life (mean age: 42.49 years). Whereas in females, the mean age is 40.3 years.



	Male	Female
Alcoholic	69	0
Non alcoholic	36	23

Figure 4: Distribution of cases among both genders. All 69 patients with alcohol induced pancreatitis were men. 36 out of 59 non alcoholic pancreatitis were men.

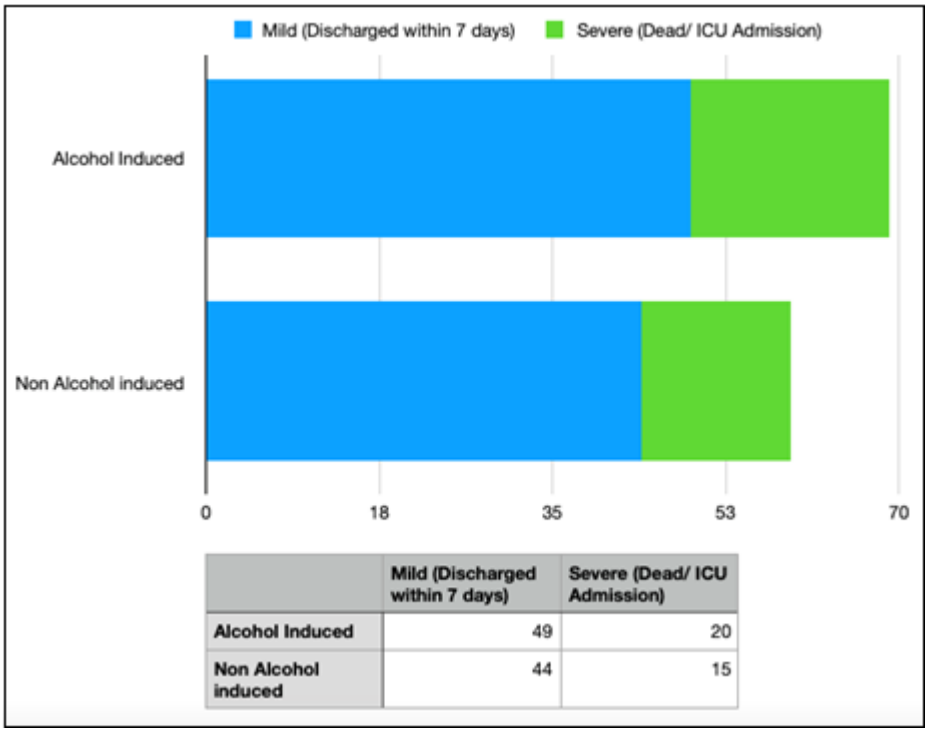


	Males	Females
Mild (Discharged)	73	20
Severe (Death + ICU)	32	3
Death	6	0

Figure 5: The outcome of the admitted cases on the 7th day after admission. Out of 128 patients, on the 7th day- 93 were discharged, 29 were in ICU and 6 had died

Table 1: Age distribution among gender and etiology

		Observations (%)	Mean +/- SD
Age (in years)	Total	128 (100%)	42.07 +/- 16.44
	Males	105(82.03%)	42.49 +/- 1.13
	Females	23(17.96%)	40.3 +/- 21.75
	Ethanol use	69 (53.91%)	44.07 +/- 11.59
	No ethanol use	59 (46.09%)	39.72 +/- 20.58



	Mild (Discharged within 7 days)	Severe (Dead/ ICU Admission)
Alcohol Induced	49	20
Non Alcohol induced	44	15

Figure 7: Compares the severity of alcohol induced vs non alcohol induced pancreatitis based on outcome. Odds ratio: 0.835, P value: 0.69 (Fisher Exact)

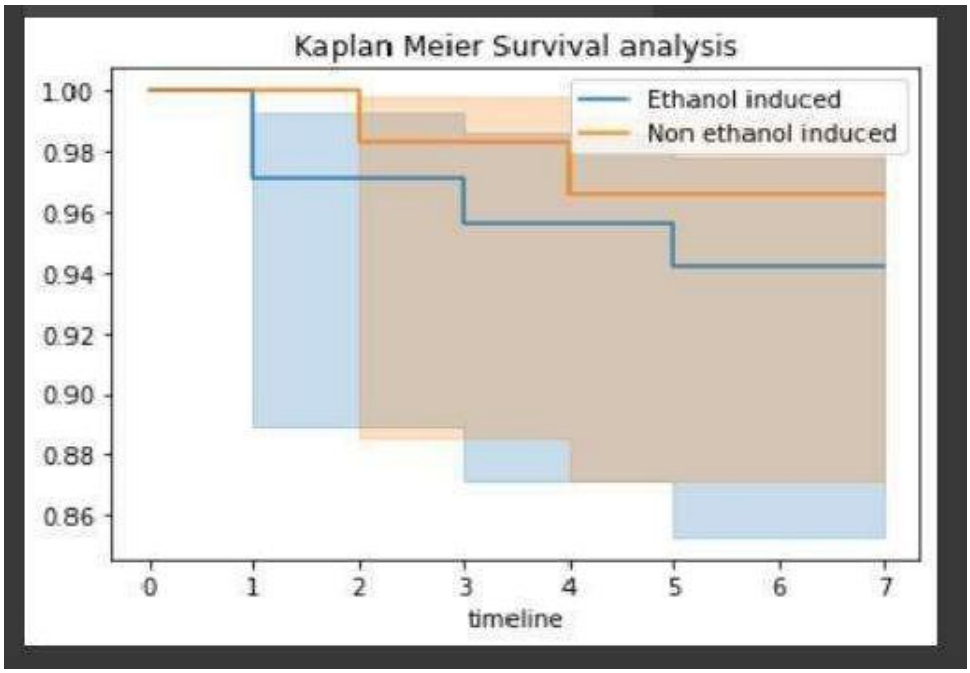


Figure 8: Kaplan Meier Survival Analysis Chart. No statistical significance present when comparing the survival of alcohol exposed and non exposed groups

Table 2: The mean and standard deviation of basic lab investigations

	Total (128)	Ethanol use (69)	No ethanol use (59)
	Mean +/- SD	Mean +/- SD	Mean +/- SD
Hemoglobin (g/dl)	12.62 +/- 1.83	12.86 +/- 1.41	12.35 +/- 2.2
Total count (cells/mm^3)	11436 +/- 3165	11186 +/- 2991	11729 +/- 3359
Platelet count (Lakh/cc)	2.61 +/- 0.98	2.59 +/- 0.91	2.64 +/- 1.06
Sodium (meq/L)	136.56 +/-11.56	137.63 +/- 3.42	135.3 +/- 16.61
Potassium (meq/L)	3.74 +/- 0.55	3.68 +/- 0.52	3.81 +/- 0.57
BUN(mg%)	21.78 +/- 13.44	22.40 +/- 13.17	21.05 +/- 13.83
S.Amylase (U/L)	2411 +/- 1911	1687 +/- 1553	3259 +/-1953
S.Lipase (U/L)	3232 +/- 1997	2259 +/- 1409	4369 +/- 1991
S.Bilirubin (mg/dl)	2.39 +/- 1.19	1.91 +/- 0.68	2.95 +/-1.41
RBS (mg/dl)	109.5 +/- 23.2	113.9 +/- 27.3	104.3 +/- 15.97

4. Discussion

Acute pancreatitis is due to a sudden inflammation of the pancreas. It is most often a mild self limiting disease and can sometimes lead to a serious condition resulting in high morbidity and death. It is thought to be due to acinar cell injury causing activation of pancreatic enzymes within the pancreatic tissue leading to a local inflammatory reaction. Sometimes, a systemic inflammatory response resulting in ARDS, multiple organ failure and death can occur[1]. There are multiple etiological factors that can cause AP. It is most often caused by cholelithiasis, followed by alcohol consumption. Together they account for over 80 % of all cases of AP[2]. This study was done in a tertiary care teaching hospital in the city of Kozhikode. 128 patients diagnosed with acute pancreatitis who were admitted in the surgery department were recruited for the study. A detailed proforma was used to collect information. Information collected included the name, age, sex, IP number, complete blood count, blood glucose level, renal function test, liver function test, serum amylase, serum lipase and the modified CT severity index score. Patients were followed up from the date of admission to the day of discharge or 7th day from admission, whichever was earlier.

In our study, 69 patients had alcoholic pancreatitis (54%) and 59 patients had non alcoholic pancreatitis (46%). [3] In an article published by Yeungnam University Hospital, South Korea - 153 patients with alcohol and gall stone pancreatitis were studied. 50 patients (39.6%) had alcoholic pancreatitis in the South Korean study. [4] Another study done by Charles Fra, et al. in California for a 10 year period included 70,231 patients hospitalized for AP, 20.3% had alcohol induced pancreatitis.[5] There is a higher incidence of alcohol induced pancreatitis in India. This difference in etiology can be attributed to the higher rate of alcoholism in India. Though India is regarded as having an abstaining culture, India has one of the largest alcohol markets in the world. Drinking habits in India are characterized by heavy, solitary drinking, predominantly spirits and typically more than five standard drinks per occasion.[6] Kerala has higher per capita consumption of alcohol in India - more than 1.76 gallons per person a year, higher than states like Punjab and Haryana. Over 40 % of Kerala's annual revenue come from alcohol sales which are government controlled- reflecting the high prevalence of alcoholism in the state.[7]

In our study, 105 (82%) of the total patients were male, while 23 (18%) were female. Fig 3 shows the age and gender distribution density plot. In the South Korean study, 81 patients (64.3%) were male and 45 were female (35.7%). Comparing the data from our study and the South Korean study, we find that there is a significantly higher number of males admitted for AP in India compared to females. This is due to the higher incidence of Alcohol associated pancreatitis in India compared to South Korea. In our study, 69 patients who had alcoholic pancreatitis were male (100%). 36 out of 59 patients with non alcoholic pancreatitis were male (61%) and 23 were female (39%). There is a high prevalence of alcohol abuse among Indian men compared to women, with misuse being less than 5% for women. The male:female ratio was determined to be 57:1.79 This is because of the cultural taboos associated with women consuming alcohol in India. However, it is noted that the number of females consuming alcohol in India are on the rise, especially in urban areas particularly among single college going or working women. Gender distribution of patients with mild and severe acute pancreatitis were also analyzed in this study. 20 out of 23 females had a mild course (86.9% of females) and 3 females had a severe form of acute pancreatitis (13%). Though 13% females had severe illness, none of them died. 73 out of 105 males had a mild episode (69.5% of males). 32 males had severe acute pancreatitis (31.75%) with 6 of them succumbing to the illness (5.7%). The gender differences data reveals that more males experienced severe disease and are at a higher risk of mortality from pancreatitis. A study by Lankisch et al. tried to determine if gender played a role in the severity and outcome of pancreatitis. Their study analyzed 274 patients (172 male and 102 female) admitted for a first attack of acute pancreatitis. It concluded that gender has no role in the severity of acute pancreatitis and eventual outcome.[8] This is in contrast to our study which had a higher rate of severe illness and death from acute pancreatitis than women. As at

least half of the males in this study had alcohol induced pancreatitis, there could be presence of other unhealthy habits such as cigarette smoking that could lead to worse outcomes in patients with acute pancreatitis. This could be an explanation for the higher rate of severe pancreatitis and mortality among men compared to women in our study, rather than gender differences alone.

In this study, the patients' ages varied from 13 to 85 years old. The Range is 72 years. The mean age is 42.07 years with a standard deviation (SD) of 16.44 years. Whereas in the South Korean study, the mean age of 153 patients was 63.6 ± 15.4 years. The range was 27-94 years.[4] The mean age of patients admitted with pancreatitis in India is lower than that of the south korean study. This difference stems from the differences in etiology. Alcoholic pancreatitis is more common in younger men as compared to gallstones which is the other major cause of acute pancreatitis which tends to affect older people[9]. If we further analyze the data collected in our study, we find that among the 105 males, 42.49 years was the mean age and the SD was 1.13 years. Whereas the female patients had a mean age of 40.3 years with a SD of 21.75 years. Of the 69 patients with alcohol induced pancreatitis, the mean age was 44.07 years with a SD of 11.59 years. Of all the 59 non alcoholic pancreatitis patients, the mean age was 39.72 years with an SD of 20.58 years. A multi-center study in Taiwan to assess the etiology of pancreatitis had data which showed that patients with alcohol-related acute pancreatitis were the youngest with a mean age of 41.5 years, while those with gallstone pancreatitis were older with a mean age of 64.1 years[9].

On examining the data collected, the mean age of alcohol associated pancreatitis patients in our study is comparable to the mean age of alcohol associated pancreatitis in the Taiwanese study. However, in our study the mean age of acute pancreatitis patients not associated with alcohol intake and the mean age of female patients do not correspond to the mean age of patients with gallstone induced pancreatitis in the Taiwanese study. This is due to the higher incidence of idiopathic pancreatitis in our study which affected young patients generally less than 30 years. Many of these patients had no history of alcohol intake and had no clear etiology. It can be postulated that these may reflect the significant presence of tropical pancreatitis in Kerala which has a prevalence of 126/100,000.10 Tropical pancreatitis generally affects young patients. According to the data collected in this study, 93 patients (72.6%) made a full recovery. 35 patients had severe acute pancreatitis (27.3%). 6 patients had died and 29 continued to be in intensive care. This corresponds to a mortality rate of 4% for acute pancreatitis and 17% for severe acute pancreatitis. It is known that acute pancreatitis has a variable outcome, with most patients having a mild episode without any sequelae and that some patients can develop a severe form of acute pancreatitis. Sarri et al. conducted a study reviewing the outcomes of acute pancreatitis in the US and Europe. It showed that over 20% of patients with acute pancreatitis develop a severe acute pancreatitis[11]. This is somewhat similar to the 27.3% of severe acute pancreatitis as determined in our study. A study by Fagenholz et al. compiled a list of admissions for acute pancreatitis between 1988 and 2003 in the United States. It showed that there was a 2% mortality from acute pancreatitis.12 Our total mortality rates are slightly higher at 4 %. This is probably due to late hospitalisation in India compared to the US. The presence of better intensive care facilities available in the United States compared to India also plays a big role. The United States has allied medical workers employed in hospitals to provide more care. Respiratory therapists and physician assistants work alongside nurses and doctors to provide care for patients especially in the ICU setting. The doctor-patient ratio is also well within WHO recommendations unlike the government hospitals in our country which are overloaded and are at the breaking point. There have been countless studies on the effect of etiology on the severity and mortality of AP. Some investigators have reported that patients with alcoholic AP have poorer prognosis compared to those with biliary AP, [2,13]. A study was done by Lankisch et al. to define the prognostic role of etiology in the course of acute pancreatitis which analyzed 208 patients. Patients with alcoholic associated pancreatitis had a significantly higher incidence of necrotizing pancreatitis, need for ventilatory support, and formation of pancreatic pseudocysts compared to other causes. Another study by Uhl et al. on the influence of etiology on the course and outcome of acute pancreatitis showed that once the disease process was initiated by the etiological factor, the course and outcome of the disease are not influenced by the etiology[14]. If we consider patients who had died or remained in the ICU after 7 days as having a severe disease, then in this study, 20 patients out of the 69 patients with alcoholic pancreatitis had a severe course of the illness. Thus 28.9% of patients with alcohol associated pancreatitis had severe disease. 4 patients died. Therefore there is a mortality rate of 5.7% for alcohol induced acute pancreatitis and 20% for severe acute alcoholic pancreatitis. 49 patients were discharged (71.01%). 17 patients of the non alcohol induced pancreatitis had a bout of severe disease, which is around28.8 %. 2 out of the 59 patients with non alcoholic pancreatitis died, hence the mortality rate is 3.3% for acute non alcohol induced pancreatitis and 11% for severe non alcoholic pancreatitis. The percentage of patients developing severe acute pancreatitis is almost the same when you compare the alcohol and non alcohol associated groups. So on calculating the Odds ratio, the severity of disease between patients with alcohol induced and non alcohol induced pancreatitis is 0.835, which is not significant. The mortality rate for alcohol induced appears to be higher than the non alcohol induced group. For confirmation, we used the Kaplan Meier survival analysis to plot a graph to compare the survival rate of alcohol induced and non alcohol induced pancreatitis. Each line on the graph corresponds to the total number of patients in the subgroup. After each death, the line dips. The blue line represents patients with alcohol induced pancreatitis. The orange line represents patients with non alcohol associated pancreatitis. The Kaplan Meyer survival analysis and log rank test showed no significant survival difference (p value 0.94) after 7 days, in patients with ethanol induced and non ethanol induced pancreatitis. In the South Korean study, 4 out of 153 patients died - all of them in the alcohol group, showing a mortality rate of 2% overall and a mortality rate of 8% for alcohol induced pancreatitis.[4]

Table 2 tabulates the mean and standard deviation (SD) of all the basic laboratory investigations of all the patients

included in the study. No significant differences were observed between the alcohol exposed and non exposed group apart from the serum bilirubin levels. The mean Hb was 12.62g/dL with a SD of 1.83g/dL. The mean total count was 11346 with a SD of 3165. The mean platelet count was 2.61Lakh with a SD of 0.98 Lakh. The mean blood urea level was 21.78 with a SD of 13.44. The mean random blood sugar was 109.5 with a SD of 23.2. The mean serum amylase was 2411 with a SD of 1911. The mean serum lipase was 3232 with a SD of 1997. No specific differences were observed in the mean values of the above mentioned routine blood tests when comparing the alcohol induced vs non alcohol induced groups. The mean Serum Bilirubin level was 2.39 mg/dL with an SD of 1.19. The mean serum bilirubin in the alcoholic group was 1.91 with an SD of 0.68, whereas in the non alcoholic group- it was 2.95 with an SD of 1.41. This difference is due to the presence of biliary obstruction secondary to choledocholithiasis in gallstone induced pancreatitis which causes direct hyperbilirubinemia.

Hyperbilirubinemia can also be caused by periductal pancreatic edema in non gallstone induced pancreatitis or extrinsic compression of the common bile duct by inflamed pancreatic tissue.

The major limitations of this study are that acute pancreatitis was evaluated as only being alcohol induced or non alcohol induced. Other causes for pancreatitis in patients without alcohol associated with pancreatitis were not assessed. Only the need for ICU admission and mortality was assessed, local complications such as pseudocysts and pancreatic duct disruptions were not evaluated and followed up. Based on the results of this study, we can say that alcohol induced pancreatitis is the major cause for acute pancreatitis admissions in this region of Kerala. More stricter measures should be taken for alcohol sale and consumption in view of the significant morbidity associated with this disease. As the mean age of the patients with alcohol induced pancreatitis is 42 years, they are most likely the sole breadwinners of their family. Significant morbidity to this age group will result in economic issues not only for their families but also the state.

We can infer from this study that there is no difference in severity of alcohol and non alcohol associated pancreatitis based on mortality rates. The overall mortality rate for acute pancreatitis in our study is low , being around 4%. However, the mortality rate for severe acute pancreatitis is 17% based on the data collected for this study.

5. Conclusion

Alcohol is the most common cause of acute pancreatitis in our patients. This highlights the serious public health concern of alcohol abuse in India, especially the malabar region. No female developing alcohol induced pancreatitis reflects the low rate of alcohol abuse among women in Indian society.

Males in general have a higher incidence of acute pancreatitis reflected in the gender distribution of acute pancreatitis patients.

There is no difference in severity between alcohol induced and non alcohol induced pancreatitis.

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