e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2025; 17(7); 1464-1469

Original Research Article

A Clinical Study of Hypertriglyceridemia Induced Acute Pancreatitis and Its Clinical Course in a Tertiary Care Centre – A Prospective Observational Study

G. Vanjinathan[1], G. Vinayagam[2], M. Rajasekar[3], S. Raasiga[4]

[1]Post Graduate, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Pondicherry, India

[2]Professor, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Pondicherry, India

[3]Professor, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Pondicherry, India

[4]Senior Resident, Department of General Surgery, Sri Venkateshwaraa Medical College Hospital and Research Centre, Pondicherry, India

Received: 01-04-2025 / Revised: 15-05-2025 / Accepted: 21-06-2025

Corresponding author: Dr. G. Vinayagam

Conflict of interest: Nil

Abstract

Background: The two most frequent causes of acute pancreatitis (AP) are gallstones and alcohol misuse. With a reported prevalence of 2-4%, hypertriglyceridemia is a rare but well-established cause of acute pancreatitis.

Objectives: The Objective of the study was to analyze demographic data (age, sex, comorbidities such as diabetes, alcohol use, etc.) of patients presenting with HTG-AP. To assess the correlation between amylase, lipase levels with various factors causing acute pancreatitis. To assess the severity of pancreatitis in various aetiologies. To evaluate recurrence rates and long-term follow-up outcomes in patients with HTG-AP.

Method: This prospective observational study was conducted at Sri Venkateshwara Medical College and Research Centre, Department of General Surgery over one year period between May 2024 to April 2025. Clinical data during hospitalization were collected including demographic and laboratory data, radiological, disease severity, organ failure and outcome

Results: Out of 112 cases, sex distribution level of acute pancreatitis was high in Males 62 and females were 50. Also, number of AP cases with hypertriglyceridemia (HTG) were higher in the males as 5 (5.6%) and females were 04 (4.5%), out of 09 (10.1%) total cases. In 18-20 years age group there was only 1 patient found AP and no any acute pancreatitis with hypertriglyceridemia. In 20–29 years age group there were 8 patients found AP and no any acute pancreatitis with hypertriglyceridemia seen. In 30–39 years age group there were 44 patients found AP and 2 patients acute pancreatitis with hypertriglyceridemia seen. Middle age male populations were more prone to develop acute pancreatitis due to hypertriglyceridemia. Regarding CT Severity Score, there was no significant difference in score with respect to aetiologies (alcohol, gall stones, hypertriglyceridemia).

Conclusion: HTG-induced acute pancreatitis is a clinically significant and potentially severe form of pancreatitis. HTGAP is the third most common cause of AP and is often associated with normal or minimally elevated serum amylase and lipase levels. Early recognition and targeted therapy, including triglyceride-lowering measures, are crucial for improving outcomes. Diet and lifestyle changes, weight reduction, strict control of diabetes along with lipid-lowering medications is critical in preventing recurrence of AP in these patients.

Keywords: Acute Pancreatitis, Aetiologies, Alcohol, Gall stones, Hypertriglyceridemia.

Introduction

The two most frequent causes of acute pancreatitis (AP) are gallstones and alcohol misuse. With a reported prevalence of 2-4%, hypertriglyceridemia is a rare but well-established cause of acute pancreatitis. [1–3]. The National Cholesterol Education Program Triglyceride (TG) levels are classified by ATP III as normal (<150), borderline high (150–199), high (200–499), and very high (>500 mg/dL) (1 mmol=88.5736 mg/dL) [4]. Although TG levels >1000 mg/dL have generally been linked to AP, it is uncertain and varies from person to person what level AP may occur at.

Numerous epidemiological studies have attempted to establish the proper threshold for TG levels that result in AP. Of the 129 patients with severe HTG in the study, 26 (20.2%) had at least one episode of AP [5]. Additionally, data from population studies in Europe indicate that 10–19% of patients with severe HTG (>1000 mg/dL) have AP [3].

According to Sandhu et al., none of the 95 patients experienced AP while their TG levels were below 1771 mg/dL, suggesting that HTG is unlikely to be the cause of acute pancreatitis at these levels [6]. In a large population research, the group with TGs levels > 500 had an adjusted hazard ratio for AP of 3.20 (CI, 1.99-5.16), compared to the group with TGs levels < 150.

Additionally, after controlling for confounders and other variables, there was a 4% increase of incidental AP for every 100 mg/dL increase in TG concentration [7]. The current suggestion that TG < 1000 mg/dL is unlikely to cause acute pancreatitis is supported by these investigations [2, 3, 8]. The precise process via which HTG causes AP is unclear.

The majority of widely accepted hypotheses are based on animal models that explain how pancreatic lipase converts excess TGs into free fatty acids (FFA), which causes ischemia and damage to pancreatic cells [2, 8]. It has also been suggested that hyperviscosity from too many TGs in pancreatic capillaries causes ischemia, however it is unclear why this ischemia exclusively affects the pancreas and no other organs. HTG-AP has been linked to certain genetic alterations, including CFTR and ApoE gene mutations [3, 8]. HTG-induced AP most likely results from the intricate interaction of several variables, each of which contributes differently to the patient. To fully understand the pathophysiology of HTG-AP, more investigation is required.

The Aim of the study was to evaluate the clinical profile of patients diagnosed with acute pancreatitis (AP). To determine the relationship between serum triglyceride levels and its clinical outcomes in Acute Pancreatitis (AP). To assess the severity of acute pancreatitis (AP) between hypertriglyceridemia (HTG) and non-hypertriglyceridemia causes (Non-HTG) using various scoring system (RANSON, APACHE II, CT SEVERITY INDEX).

The Objective of the study was to analyze demographic data (age, sex, comorbidities such as diabetes, alcohol use, etc.) of patients presenting with HTG-AP. To assess the correlation between amylase, lipase levels with various factors causing acute pancreatitis.

To assess the severity of pancreatitis in various aetiologies. To evaluate recurrence rates and long-term follow-up outcomes in patients with HTG-AP.

Materials and Methods

This prospective observational study was conducted at Sri Venkateshwara Medical College and Research Centre, Department of General Surgery over one year period between May 2024 to April 2025.

Clinical data during hospitalization were collected including demographic and laboratory data, radiological, disease severity, organ failure and outcome following treatment;

Inclusion Criteria

- Age ≥ 18 years
- Serum triglyceride (TG) levels ≥ 1000 mg/dL (11.3 mmol/L) at presentation
- Availability of complete clinical records, including:
- # Laboratory values - serum amylase and lipase levels
- # Imaging results - CT scan imaging

Exclusion Criteria

- Chronic Pancreatitis or Pancreatic Neoplasms
- Serum Triglyceride Levels < 500 mg/dL at Presentation
- Pregnancy
- Patients who declined consent
- Known Genetic Pancreatic Disorders: e.g., cystic fibrosis, hereditary pancreatitis

Statistical Analysis

Statistical analysis was carried out using SPSS-24. P-value less than 0.005 was considered statistically significant. Statistical tests were applied based on the type of variable and normality of the data.

Parameters

- Male to Female Ratio
- Mean Age
- Alcohol
- Serum Triglyceride levels at admission
- Serum Amylase and Lipase level
- CT severity index

Results

Table 1: Sex distribution among acute pancreatitis

	Males	Females	Total population
Number of acute pancretitis (AP)	62	50	112
Number of AP cases with hypertriglceridemia (HTG) (Percentages)	05 (5.6%)	04 (4.5%)	09 (10.1%)

Out of 112 cases, sex distribution level of acute pancreatitis was high in Males 62 and females were 50. Also, number of AP cases with hypertriglceridemia (HTG) were higher in the males as 5 (5.6%) and females were 04 (4.5%), out of 09 (10.1%) total cases, Table 1.

Table 2: Age wise distribution in acute pancreatitis

Age groups	No. of acute pancreatitis	No. of acute pancreatitis with hypertriglyceridemia
18-20 years	01	00
20–29 years	08	00
30–39 years	44	02
40–49 years	36.4	05
50–59 years	18.6	01
≥60 years	04	01

In 18-20 years age group there was only 1 patient found AP and no any acute pancreatitis with hypertriglyceridemia. In 20–29 years age group there were 8 patients found AP and no any acute pancreatitis with hypertriglyceridemia seen. In 30–39 years age group there were 44 patients found AP and 2 patients acute pancreatitis with hypertriglyceridemia seen. Middle age male populations were more prone to develop acute pancreatitis due to hypertriglyceridemia. In 40–49 years age group there were 36.4 patients found AP and 5 patients acute pancreatitis with hypertriglyceridemia seen. In 50–59 years age group there were 18.6 patients found AP and 1 patient acute pancreatitis with hypertriglyceridemia seen. Above ≥60 years age group there were 4 patients found AP and 1 patient acute pancreatitis with hypertriglyceridemia seen, Table 2.

Table 3: Causative factors distribution

Components	Numbers of acute pancreatitis (AP)	Percentage
Hypertriglyceridemia	09	10%
Alcohol intake	28	25%
Gall stones	45	40%
Hypertriglyceridemia + alcohol	14	11%
Hypertriglyceridemia + gall stones	16	14%

Acute pancreatitis causes due to Hypertriglyceridemia at 9 (10%) patients, which was lower out of all the aetiologies. 28 (25%) patients causes AP due to Alcohol intake. 45 (40%) patients causes AP due to Gall stones. which was higher number out of all the aetiologies. 14 (11%) patients causes AP due to combination of Hypertriglyceridemia and alcohol consumptions. 16 (14%) patients causes AP due to combination of Hypertriglyceridemia and gall stones, Table 3.

Table 4: Amylase & lipase distribution

SN	Components	Serum amylase	Serum lipase
1	Hypertriglyceridemia	Decreased/ normal	Decreased / normal
2	Alcohol intake	Increased (96%) (26 people)	Increased (100%) (28 people)
3	Gall stones	Increased (84%) (38 people)	Increased (96%) (43 people)
4	Hypertriglyceridemia + alcohol	Increased (94%) (13 people)	Increased (100%) (14 people)
5	Hypertriglyceridemia + gall stones	Increased (85%) (14 people)	Increased (100%) (16 people)

Serum Amylase and Lipase levels remains increased in all aetiologies except in Hypertriglyceridemia. Serum Amylase (96%) (26 people) and Lipase levels (100%) (28 people) were increased in the Alcohol intake patients. Serum Amylase (84%) (38 people) and Lipase levels (96%) (43 people) were increased in the Gall stones patients. Serum Amylase (94%) (13 people) and Lipase levels (100%) (14 people) were increased in the Hypertriglyceridemia + alcohol patients. Serum Amylase (85%) (14 people) and Lipase levels (100%) (16 people) were increased in the Hypertriglyceridemia + gall stones patients, Table 4 and Figure 1.

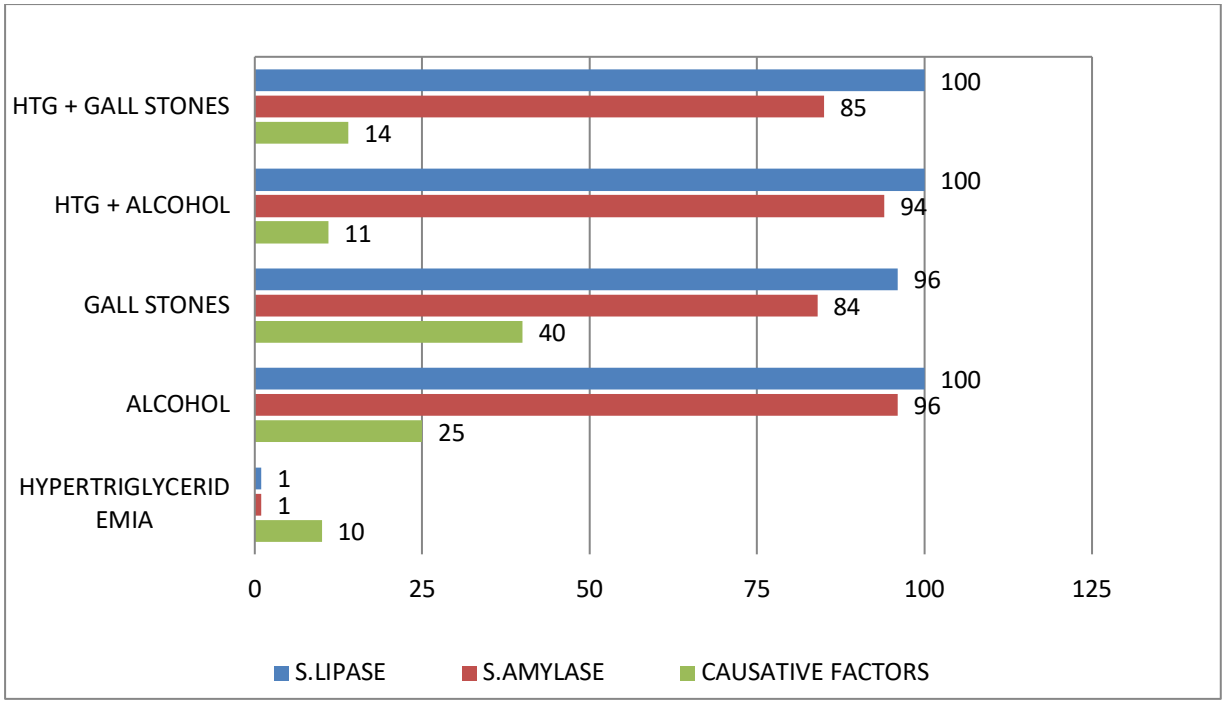

Figure 1: Factors causing pancreatitis

Table 5: CT severity score wise distribution

SN	Components	CT severity score
1	Hypertriglyceridemia	High score (>7)
2	Alcohol intake	High score (>7)
3	Gall stones	High score (>7)
4	Hypertriglyceridemia + alcohol consumption	High score (>7)
5	Hypertriglyceridemia + gall stones	High score (>7)

Regarding CT Severity Score, there was no significant difference in score with respect to aetiologies (alcohol, gall stones, hypertriglyceridemia), Table 5.

Discussions

Our prospective observational study demonstrates that HTGAP accounts for 8% (9/112) of all cases of acute pancreatitis. Although HTG has been regarded as the third most common cause of AP after gallstones and alcohol, the exact incidence of HTGAP is not known and various studies have estimated HTG as the causative factor in up to 1-14% of all cases of AP, According to the previously published literature [9, 10]. HTG-AP has grown in incidence and importance.

Our data also confirmed additional etiological factors (alcohol and Serum Triglyceride levels, Serum Amylase and Lipase level). Our data are in accordance with Scherer et al. who recommend that HTG-AP should be suspected in the case of significant alcohol consumption [8].

In our study, Out of 112 cases, sex distribution level of acute pancreatitis was high in Males 62 and females were 50. Also, number of AP cases with hypertriglceridemia (HTG) were higher in the males as 5 (5.6%) and females were 04 (4.5%), out of 09 (10.1%) total cases. Our data analysis supported findings by Zheng et al. [11] and Zhu et al. [12] that HTG is substantially associated with male gender and younger age. Given that alcohol-related HTG primarily affects males at younger ages, and that underlying genetic defects behind HTG lead to younger manifestation, this is not surprising. [13, 8, 14].

In our research, acute pancreatitis causes due to Hypertriglyceridemia at 9 (10%) patients, which was lower out of all the aetiologies. 28 (25%) patients causes AP due to Alcohol intake. 45 (40%) patients causes AP due to Gall stones. which was higher number out of all the aetiologies. 14 (11%) patients causes AP due to combination of Hypertriglyceridemia and alcohol consumptions. 16 (14%) patients causes AP due to combination of Hypertriglyceridemia and gall stones.

Serum Amylase and Lipase levels remains increased in all aetiologies except in Hypertriglyceridemia. Serum Amylase (96%) (26 people) and Lipase levels (100%) (28 people) were increased in the Alcohol intake patients. Serum Amylase (84%) (38 people) and Lipase levels (96%) (43 people) were increased in the Gall stones

patients. Serum Amylase (94%) (13 people) and Lipase levels (100%) (14 people) were increased in the Hypertriglyceridemia + alcohol patients. Serum Amylase (85%) (14 people) and Lipase levels (100%) (16 people) were increased in the Hypertriglyceridemia + gall stones patients. Our data confirmed a significant reduction of amylase and lipase levels with the elevation of Hypertriglyceridemia. Furthermore, case reports have been published by Singh et al. [15] and Sotello et al. [16], presenting HTG-AP patients with normal amylase and lipase levels.

Regarding CT Severity Score, there was no significant difference in score with respect to aetiologies (alcohol, gall stones, hypertriglyceridemia). Our data analysis showed that HTG considerably exacerbated the severity of AP [17]. In contrast to alcoholic etiology, HTG exacerbates the severity of AP, as verified by Navarro et al. [18] and Goyal et al. [19]. It is obvious that the underlying mechanism is intricate. Long-lasting cytosolic Ca2+ increase, mitochondrial damage, and membrane lipid peroxidation are all caused by unsaturated free fatty acids (UFAs), which are produced from TG [20, 21]. Fatty acid ethyl esters, or FAEEs, are non-oxidative ethanol metabolites that contribute to the long-term increase in Ca2+ and decrease in ATP levels when alcohol intake is increased [22, 23].

In addition, ischemia and acidosis in the pancreatic capillaries are brought on by the increased plasma viscosity brought on by hyperchylomicronemia [24]. This pathologic setting causes pancreatic lipase leakage and early trypsinogen activation, which further releases and accumulates free fatty acids (FFA) [25, 20, 25]. Additionally, UFAs boost the mRNA production of neutrophil chemoattractants and tumor necrosis factor-alpha (TNF-a), which causes a systemic pro-inflammation and exacerbates AP. [21].

There are various limitations to our study. Unfortunately, only 50% of the whole cohort matched the inclusion criteria, even though all data were gathered prospectively and cases having TG measurements within the first three days of admission were included in the study. By contrasting the epidemiological and major outcome distributions of the examined data with those of the entire cohort, we tried to reduce these limitations. We verified that the population being studied is representative of a typical AP cohort.

Conclusions

HTG-induced acute pancreatitis is a clinically significant and potentially severe form of pancreatitis. HTGAP is the third most common cause of AP and is often associated with normal or minimally elevated serum amylase and lipase levels. Early recognition and targeted therapy, including triglyceride-lowering measures, are crucial for improving outcomes. Diet and lifestyle changes, weight reduction, strict control of diabetes along with lipid-lowering medications is critical in preventing recurrence of AP in these patients.

Ethical approval: The study was approved by the Institutional Ethics Committee.

References

1. M. R. Fortson, S. N. Freedman, and P. D.Webster, “3rd. Clinical assessment of hyperlipidemic pancreatitis,” The American Journal of Gastroenterology, vol. 90, pp. 2134–2139, 1995.
2. W. Tsuang, U. Navaneethan, L. Ruiz, J. B. Palascak, and A. Gelrud, “Hypertriglycerid emic pancreatitis: presentation and management,” American Journal of Gastroenterology, vol. 104, no. 4, pp. 984–991, 2009.
3. P. Valdivielso, A. Ramirez-Bueno, and N. Ewald, “Current knowledge of hypertriglyceridemic pancreatitis,” European Journal of Internal Medicine, vol. 25, no. 8, pp. 689–694, 2014.
4. Expert Panel on Detection Evaluation and Treatment of High Blood Cholesterol in Adults, “Executive summary of the third report of the National Cholesterol Education Program (NCEP) expert panel on detection, evaluation, and treatment of high blood cholesterol in adults (adult treatment panel III),” Journal of the American Medical Association, vol. 285, no. 19, pp. 2486–2497, 2001.
5. C. L. Linares, A. L. Pelletier, S. Czernichow et al., “Acute pancreatitis in a cohort of 129 patients referred for severe hypertriglyceridemia,” Pancreas, vol. 37, no. 1, pp. 13–22, 2008.
6. S. Sandhu, A. Al-Sarraf, C. Taraboanta, J. Frohlich, and G. A. Francis, “Incidence of pancreatitis, secondary causes, and treatment of patients referred to a specialty lipid clinic with severe hypertriglyceridemia: a retrospective cohort study,” Lipids in Health and Disease, vol. 10, article 157, 2011.
7. M. J. Murphy, X. Sheng, T. M. Macdonald, and L. Wei, “Hypertriglyceridemia and acute pancreatitis,” JAMA Internal Medicine, vol. 173, no. 2, pp. 162–164, 2013.
8. J. Scherer, V. P. Singh, C. S. Pitchumoni, and D. Yadav, “Issues in hypertriglyceridemic pancreatitis: an update,” Journal of Clinical Gastroenterology, vol. 48, no. 3, pp. 195–203, 2014.
9. P_arniczky A, Kui B, Szentesi A, Bal_azs A, Sz}ucs _A, Mosztbacher D, et al. Prospective, multicentre, nationwide clinical data from 600

cases of acute pancreatitis. PLoS One 2016; 11(10):e0165309.
10. Roberts S, Akbari A, Thorne K, Atkinson M, Evans P. The incidence of acute pancreatitis: impact of social deprivation, alcohol consumption, seasonal and demographic factors. Aliment Pharmacol Therapeut 2013; 38(5):539e48.
11. Zheng Y, Zhou Z, Li H, Li J, Li A, Ma B, et al. A multicenter study on etiology of acute pancreatitis in Beijing during 5 years. Pancreas 2015; 44(3):409e14.
12. Zhu Y, Pan X, Zeng H, He W, Xia L, Liu P, et al. A study on the etiology, severity, and mortality of 3260 patients with acute pancreatitis according to the revised Atlanta classification in Jiangxi, China over an 8-year period. Pancreas 2017; 46(4):504e9.
13. Yadav D, Lowenfels AB. The epidemiology of pancreatitis and pancreatic cancer. Gastroenterology 2013; 144(6):1252e61.
14. Wilsnack RW, Wilsnack SC, Kristjanson AF, Vogeltanz-Holm ND, Gmel G. Gender and alcohol consumption: patterns from the multinational GENACIS project. Addiction 2009; 104(9):1487e500.
15. Singh A, Shrestha M, Anand C. Acute pancreatitis with normal amylase and lipasedan ED dilemma. Am J Emerg Med 2016; 34(5):940. e5-. e7.
16. Sotello D, Rivas AM, Nugent KM, editors. Newly diagnosed acromegaly presenting with hypertriglyceridemic pancreatitis with normal amylase and lipase levels. Baylor University Medical Center Proceedings. Taylor & Francis; 2014.
17. Wang S-H, Chou Y-C, Shangkuan W-C, Wei K-Y, Pan Y-H, Lin H-C. Relationship between plasma triglyceride level and severity of hypertriglyceeridemic pancreatitis. PloS One 2016;11(10):e0163984
18. Navarro S, Cubiella J, Feu F, Zambon D, Fernandez-Cruz L, Ros E. Hypertriglycer idemic acute pancreatitis. Is its clinical course different from lithiasic acute pancreatitis? Med Clínica 2004; 123(15):567e70.
19. Goyal H, Smith B, Bayer C, Rutherford C, Shelnut D. Differences in severity and outcomes between hypertriglyceridemia and alcohol-induced pancreatitis. N Am J Med Sci 2016; 8(2):82.
20. Yang F, Wang Y, Sternfeld L, Rodriguez J, Ross C, Hayden M, et al. The role of free fatty acids, pancreatic lipase and Ca2þ signalling in injury of isolated acinar cells and pancreatitis model in lipoprotein lipase-deficient mice. Acta Physiol 2009; 195(1):13e28.
21. Navina S, Acharya C, DeLany JP, Orlichenko LS, Baty CJ, Shiva SS, et al. Lipotoxicity causes multisystem organ failure and exacerbates acute pancreatitis in obesity. Sci Transl Med 2011; 3(107). 107ra10-ra10.
22. Mal_eth J, Hegyi P. Ca2þ toxicity and mitochondrial damage in acute pancreatitis: translational overview. Phil Trans Biol Sci 2016; 371(1700):20150425.
23. Hegyi P, Petersen OH. The exocrine pancreas: the acinar-ductal tango in physiology and pathophysiology. In: Reviews of physiology, biochemistry and pharmacology, vol. 165. Springer; 2013. p. 1e30.
24. Yadav D, Pitchumoni C. Issues in hyperlipidemic pancreatitis. J Clin Gastroenterol 2003; 36(1):54e62.
25. Kimura W, M€ossner J. Role of hypertriglyceridemia in the pathogenesis of experimental acute pancreatitis in rats. Int J Gastrointest Canc 1996; 20(3): 177e84.