

Significant Reduction of Carbohydrate 19-9 Antigen Levels in a Patient of Acute on Chronic Pancreatitis through Ayurvedic Treatment Protocol

Vaidya Balendu Prakash¹, Shikha Prakash², Neha Negi³, Sneha Tiwari Sati⁴

Padaav – A Speciality Ayurvedic Treatment Centre, Uttarakhand

Corresponding Author: Vaidya Balendu Prakash, Prakash Villa, Near Rave Cinemas, Danpur Area, Rudrapur, Uttarakhand, India

Abstract: *Pancreatitis is an inflammatory and irreversible disorder of Pancreas, though unpredictable in nature. It's broadly categorized in acute and chronic pancreatitis depending upon the diagnostic parameters. Both types of pancreatitis are managed by using tools of conventional treatment; however natural course of progression of the diseases process remains unbeatable. Pancreatitis may also lead to pancreatic cancer and a tumor marker called Carbohydrate 19-9 antigen (CA 19-9) is being used routinely to assess the progression of the disease. The normal value of CA 19-9 in the serum is <37 U/mL, whereas, levels more than 300 U/mL are considered definite indicators of pancreatic cancer. Here, we report a case of 52 years old male from Eastern Uttar Pradesh in India who was initially diagnosed for Acute Necrotizing pancreatitis and was treated conservatively by subject experts. Later he suffered with seven more episodes within three years of initial diagnosis and was dealt in emergencies. His clinical condition continued to deteriorate and he lost 15 kg body weight during the course of disease. At this juncture, he opted to a north India based specialty Ayurvedic treatment centre and was treated with metal based Ayurvedic formulations, daily diet of 2000 to 2200 calories and complete mental and physical rest. He responded well to Ayurvedic treatment protocol (ATP) and showed overall improvement. There was also remarkable improvement in his rising CA 19-9 levels, that turned to normal in the first hundred eight days of ATP, which needs to be explored further for its path making therapeutic values.*

Keywords: Pancreatitis, Carbohydrate 19-9 Antigen, Ayurveda, Pancreatic Cancer

1. Introduction

The pancreas is an organ that produces substances which impact digestion and blood sugar. When pancreas becomes inflamed or swollen, it causes a serious health problem¹. The pancreas produces and secretes digestive enzymes and bicarbonate. These enzymes include amylase, lipase and proteases that break down carbohydrates, fats, and proteins in the small intestine. Bicarbonates, on the other hand, neutralize the acidic substances of the stomach as they enter the small intestine. Pancreatic duct transports these digestive enzymes and bicarbonate from the pancreas to the small intestine. Blockage of the pancreatic duct causes enzymes and bicarbonate reverse into the pancreas, leading to inflammation and causing pancreatitis².

Pancreatitis is an inflammation of the pancreas that leads to implacable abdominal pain radiating to back, along with nausea and vomiting. The TIGAR-O (Toxic-Metabolic, Idiopathic, Genetic, Autoimmune, Recurrent and Severe Acute Pancreatitis, Obstructive) pancreatitis etiology is a classification system of factors that contribute to malnutrition, exocrine and endocrine insufficiency, formation of pseudocyst, obstruction of bile duct and pancreatic cancer³.

Carbohydrate 19-9 antigen (CA19-9), discovered in 1982, is regularly expressed in the pancreatic-biliary cells⁴. In healthy individuals, it is found in low concentration in the serum (<37 U/mL), whereas, levels more than 300 U/mL are considered definite indicators of pancreatic cancer⁵. CA19-9 has been analyzed in many cancer entities i.e., colorectal cancer, gastric cancer, ovarian cancer, and bile duct cancer, but in pancreatic cancer patients it shows highest sensitivity

and specificity⁶. Worldwide pancreatic cancer represents the seventh leading cause of mortality in spite of being only the twelfth most common malignancy⁷.

Ayurveda comprises of drugs derived not only from herbs but also from minerals and metals. A specialized branch of Ayurveda – “Rasashastra” means the “Science of Mercury”. Combination of mercury with any drug was supposed to reduce its dose and increase its efficacy⁸. The use of mercury in therapeutics has transformed the management of diseases and the medicines are referred to as bio-enhancers rather than drugs. Here, we present the case report of an Uttar Pradesh based man who was first diagnosed for Necrotizing Pancreatitis in September, 2019. He opted for Ayurvedic Treatment Protocol (ATP) in 2022 and presented with elevated Serum CA19-9 level.

2. Case Report

A 52-year-old man from UP had an episode of severe abdominal pain with vomiting and fever in September, 2019 and consulted the Gastroenterologist at King Georges Medical University, Lucknow. He was admitted for six days and treated with intravenous fluids, painkillers, antacids, and antibiotics. His ultrasonography of the abdomen revealed diffuse bulky and heterogeneous pancreas with intrapancreatic and peripancreatic collection, mild hepatosplenomegaly, and mild ascites with raised values of serum amylase (292U/L), CRP (304), TLC (13200) and low sodium (129) in blood examination.

In October 2019, the patient again experienced severe abdominal pain and fever and was admitted to the same hospital for nine days and treated with intravenous fluid,

painkillers, antacids, and antibiotics. His CECT whole abdomen revealed Necrotizing pancreatitis with raised values of serum amylase (549.3U/L), serum lipase (152.5U/L), CRP (110.5), total serum bilirubin (2.38) in blood examination.

The patient experienced seven more similar episodes of pain and was admitted for about a week each time (Table 1). The diagnosis consistently indicated Acute Necrotizing Pancreatitis. In January 2020, his CECT whole abdomen revealed Pancreatitis with Pseud pancreatic cyst with extension and internal foci and communication with main pancreatic duct. During one such attack in October 2022, the patient was diagnosed with Acute on Chronic Pancreatitis with walled off necrotic collection and portal hypertension.

The patient lost 15kg of body weight during this period and his condition was being deteriorated day by day. At this juncture, he came to know about Uttarakhand based

specialty Ayurvedic treatment center and started treatment there. He was admitted in December 2022 for three weeks residential Ayurvedic treatment protocol (ATP), comprising of herbo mineral Ayurvedic formulations, customized diet, and lifestyle following Ayurvedic concepts of *Aahar*, *Vihar* and *Aushadh*. The patient presented with raised CA19-9 levels and symptoms of abdomen pain, weakness, and vomiting. He was put on herbo-mineral Ayurvedic formulations including *Amar*⁹, *Abhrak Bhasam*¹⁰, *Kamdudha Ras*¹¹, *Navabal Rasayan*¹², *Rasonvati*¹³ and *Ajeernari vati*¹⁴ (Table 2).

He was given a 1600-2000 calorie diet including dairy products, divided into three meals and three snacks in a day (Table 3).

The patient was advised complete mental and physical rest with eight hours of sleep at night. He was asked to stop consuming tea, coffee, aerated drinks, alcohol, refined flour, onion, garlic, tomato, and packaged or reheated food items.

Table 1: Details of hospitalizations due to Pancreatitis

Number	Date	Symptoms	Hospital	Investigations on admissions	Treatment
1 st	September 2019	Severe abdominal pain, vomiting, fever	King Georges Medical University, Lucknow	Serum Amylase – 292, Serum lipase – 95.9, CRP – 304.2, TLC – 13,200 USG whole abdomen - diffuse bulky and heterogeneous pancreas with into pancreatic and peripancreatic collection	IV fluids, painkillers, and antacids
2 nd	October 2019	Severe abdominal pain, fever	King Georges Medical University, Lucknow	Serum Amylase – 549.3, Serum lipase – 152.5, Serum bilirubin – 2.38, CRP – 110.5. CECT – Necrotizing pancreatitis	IV fluids, painkillers and antacids, enzymes
3 rd	December 2019	Severe abdominal pain, fever, weakness	King Georges Medical University, Lucknow	USG whole abdomen – Acute Necrotizing Pancreatitis	IV fluids, painkillers and antacids, enzymes
4 th	January 2020	Abdominal pain, vomiting	King Georges Medical University, Lucknow	CECT – Pancreatitis with Pseudo pancreatic cyst	IV fluids, painkillers
5 th	February 2020	Abdominal pain, vomiting	King Georges Medical University, Lucknow	---	IV fluids, painkillers
6 th	March 2020	Abdominal pain, vomiting	King Georges Medical University, Lucknow	Ultrasound – Necrotizing Pancreatitis	IV fluids, painkillers
7 th	August 2022	Abdominal pain	Local clinic at Shahjahanpur	---	IV fluids, painkillers
8 th	October 2022	Abdominal pain, vomiting	King Georges Medical University, Lucknow	Serum amylase – 273, Serum lipase – 116, Plasma glucose – 189	IV fluids, painkillers
9 th	November 2022	Abdominal pain, vomiting	King Georges Medical University, Lucknow	CECT – Acute on Chronic Pancreatitis with walled off necrotic collection Endoscopy – Portal hypertension and sequel of Pancreatitis	IV fluids, painkillers

Table 2: Details of medicines given

Name of medicine	Medium	Dose schedule	Duration
Abhrakbhasam 62.5mg + Kamdudharas 250mg	With honey	Thrice a day at 7am, 3pm and 6pm	8 th December, 2022
Amar capsule 45mg	With malai+chana	Thrice a day just before breakfast, lunch, and dinner	
Ajeernarivati	With normal water	2 tablets thrice a day after meal	
Abhrakbhasam 62.5mg + Kamdudharas 250mg	With saliva	Twice a day at 7am and 5pm	9 th December, 2022 to 18 th December, 2022
Navabalarasayan 250mg	With honey	Thrice a day	
Kamdudharas 250mg	With saliva	Four times a day at 6:30am, 12:30pm, 3:30pm and 6:30pm	19 th December, 2022 to 27 th December, 2022
Amar capsule – 45mg with malai and chana	With malaichana	Thrice a day just before breakfast, lunch, and dinner	
Rasonvati - 2 tablets thrice a day after meal	With hot water	Two tablets after breakfast, lunch, and dinner	
Abhrakbhasam 62.5mg + Kamdudharas 250mg – twice a day	With saliva	Twice a day at 7am and 5pm	28 th December, 2022 to 29 th December, 2022

Amar capsule – 62.5mg thrice a day with malai and chana	With malaichana	Thrice a day just before breakfast, lunch, and dinner	30 th December, 2022 to 6 th April, 2023
Rasonvati - 2 tablets thrice a day after meal.	With normal water	Two tablets after breakfast, lunch, and dinner	
Abhrakbhasam 62.5mg + Kamdudharas 250mg – twice a day	With saliva	Twice a day at 7am and 5pm	
Amar capsule – 35mg thrice a day with malai and chana	With malaichana	Thrice a day just before breakfast, lunch, and dinner	
Rasonvati - 2 tablets thrice a day after meal.	With normal water	Two tablets after breakfast, lunch, and dinner	

Table 3: Details of prescribed diet

Snacks/Meals	Items
8am (Breakfast)	30gm Jaudaliya/ poha/upma + chenna + 1bowl seasonal fruits + chutney/ Soojikhee + kishmish + banana + chenna
11am (Mid-morning snacks)	Roasted puffed rice/ Makhana + herbal tea / 200ml buttermilk / 1 bowl seasonal fruits/ sugarcane juice
1pm (Lunch)	Moong dal khichdi/ Jhangora millet + Dal (moong/masoor/arhar) + curd + seasonal green vegetable + roasted papad + chutney + lemon pickle
4pm (Evening snacks)	Roasted puffed rice/ Makhana + herbal tea / 200ml buttermilk / 1 bowl seasonal fruits/ sugarcane juice
7pm (Dinner)	Jhangora millet Khichdi/ Chapati (chokar:jau:chana) + seasonal green vegetable + curd + roasted papad + chutney + lemon pickle/ moong dal soup + lemon
9pm (post-dinner snacks)	1 small serving custard/ Jhangorakheer/ fruit cream

3. Result

Gradually the patient became asymptomatic during the initial indoor treatment and his overall general health also started improving. Patient was discharged from the center on 30th January, 2023 with one month treatment to continue at home with daily monitoring over phone and through mails.

Effect of treatment was assessed based on physical symptoms, laboratory parameters, and improved quality of life. There was marked improvement in his CA19-9 levels within three months of commencement of ATP (Figure 1).

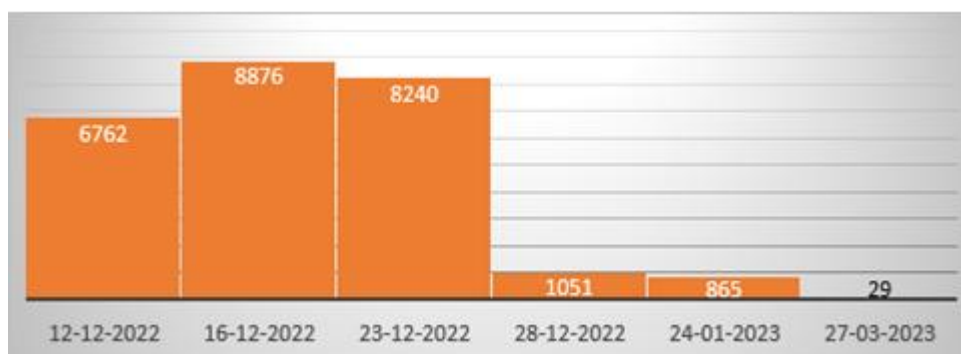


Figure 1: Lowering effect on CA19-9 levels in CP Patient through ATP

x-axis represents the dates on which blood tests were conducted and Y-axis represents the CA19-9 levels in U/mL.

4. Discussion

Pancreatitis is a condition characterized by inflammation of the pancreas, resulting in debilitating abdominal pain, nausea, and vomiting. Pancreatitis is broadly classified as acute and chronic pancreatitis. The etiology of chronic pancreatitis can be multifactorial, including toxic-metabolic, idiopathic, genetic, autoimmune, recurrent, severe acute pancreatitis, and obstructive factors (TIGAR-O classification). As per reports, up to about 40% patients of Chronic Pancreatitis are known to develop pancreatic cancer in the long run. Pancreatic cancer is a highly lethal malignancy and ranks as the seventh leading cause of cancer-related deaths worldwide. Therefore, screening is crucial for timely diagnosis and treatment.

Carbohydrate 19-9 antigen (CA19-9) is a biomarker expressed in pancreatic-biliary cells and is commonly used as a diagnostic marker for pancreatic cancer. The Carbohydrate Antigen 19-9 is present in the normal epithelial cells of the gall bladder, biliary cells, stomach and pancreas. Its elevated values are not pathognomonic of cancer of the pancreas but might be indicative of other malignancies as well as in benign conditions. Serum CA19-9 levels was elevated in patients with AP, especially in patients with biliary pancreatitis. AP patients with significantly increased CA19-9 levels may have a higher risk for the presence of pancreatic cancer¹⁵. In healthy individuals, CA19-9 levels are typically lower than 32 U/mL, while significantly elevated levels (>300 U/mL) are considered indicative of pancreatic cancer. The elevated CA19-9 values also effects survival rate of patients starting from one year survival rate in 38% patient with baseline CA19-9 >

1000ng/mL, the median OS was 6.1 months and the one year survival rate was 15%¹⁶. Hence, routinely monitoring of CA19-9 levels during hospitalization for AP patients are mandatory and significant increased CA19-9 levels in acute pancreatitis patients predicts the presence of pancreatic cancer.

In the present case report, the patient was initially diagnosed with acute necrotizing pancreatitis and subsequently developed acute on chronic pancreatitis with walled-off necrotic collection and portal hypertension. He had elevated CA19-9 levels on admission (6762 U/mL). Subsequent laboratory investigations showed that the CA19-9 levels gradually reduced and reached normal level at 108th days of starting of Ayurvedic treatment. Patient also experienced a gradual improvement in other symptoms and gained overall general health.

Ayurveda, an ancient Indian system of medicine, encompasses various treatments derived from herbs, minerals, and metals. The specialized branch of Ayurveda known as "Rasashastra" focuses on the use of mercury-based preparations to enhance the efficacy of medications. In this case report, the patient sought Ayurvedic Treatment Protocol (ATP) at a specialized Ayurvedic treatment center in Uttarakhand. During the ATP, the patient received a combination of herbo-mineral Ayurvedic formulations, a customized diet, and lifestyle modifications based on Ayurvedic principles. The herbo-mineral formulations included Amar, AbhrakBhasam, KamdudhaRas, NavabalRasayan, Rasonvati, and Ajeernarivati. The patient also adhered to a specific dietary regimen and lifestyle recommendations, including avoiding certain foods and practicing mental and physical rest.

The observed decrease in CA19-9 levels in this case suggests a potential beneficial effect of Ayurvedic treatment on pancreatic health. Although CA19-9 is commonly associated with pancreatic cancer, its levels can also be influenced by various factors, including inflammation and tissue damage. It is possible that the Ayurvedic treatment contributed to the reduction in inflammation and improved pancreatic function, leading to a decrease in CA19-9 levels.

It is imperative to mention that CA19-9 lowering effect seen in this case report is in continuation to the earlier study adding to the therapeutic values of metal based Ayurvedic formulations¹⁷. Similarly, MBAF have also demonstrated pancreatitis protective properties in experimental studies¹⁸. This case report might be an add on to anecdotal evidences related to the role of Ayurvedic interventions in the management of Pancreatitis. However, further researches are necessary to understand the intrigue phenomena of MBF by conducting appropriate in vivo and in vitro experimental studies along with randomized clinical trials. Though MBFT have No Observed Adverse Effect Level (NOAEL) in acute, sub acute and chronic toxicological studies (data on file), more pragmatic studies need to be design to ascertain multi level safety.

In conclusion, this case report highlights the potential of Ayurvedic Treatment Protocol in improving symptoms and reducing CA19-9 levels in a patient with chronic

pancreatitis. CA19-9 values are significant in monitoring the disease process if the value is same disease will be stable, decreasing CA19-9 value may mean treatment is working and subsequent rise in CA19-9 may suggest that the disease is growing up. There are reports that CA19-9 value decrease after receiving radiation, chemotherapy and surgery among cancer patients but there is no reference about spontaneous induced CA19-9 levels among patients of pancreatitis.

In the above background, normalizations of CA19-9 from 6762U/mL to 29U/mL within 108 days of Ayurvedic treatment protocol are highly significant. It is interesting to note that the initial days of ATP, CA19-9 rose to 8876 and then started showing sharp fall in the values after completing first ten days of ATP and leading to complete normalcy in 108 days of ATP.

MBAF did not possess cytotoxic properties and the gradual fall indicates that MBF might have immunomodulator effect. In-vitro and in-vivo studies could be carried to access its impact on cell regulation and anti-inflammatory properties in pancreatic disorders.

5. Conclusion

The study shows that Ayurvedic treatment protocol which is effective in managing Pancreatitis might also have a crucial role to play in the prevention of pancreatic cancer.

6. Future Scope

The ATP, comprising of MBAF, customized diet and life style might pave the ways for its scientific scrutiny and the consequent development of this approach might add a novel therapy in the prevention and treatment of pancreatic disorders.

References

- [1] Luther M (2023) Causes, Symptoms and Diagnosis of Swollen Pancreas: Commentary. *PancreatDisordTher.* 13:259
- [2] Dashara T (2023) Exploring the Importance and Functionality of the Pancreatic Duct in Digestive Health. *PancreatDisordTher.* 13:258
- [3] Pham A, Forsmark C. Chronic pancreatitis: review and update of etiology, risk factors, and management. *F1000Res.* 2018 May 17;7:F1000 Faculty Rev-607. doi: 10.12688/f1000research.12852.1. eCollection 2018
- [4] Magnani JL, et al. A monoclonal antibody-defined antigen associated with gastrointestinal cancer is a ganglioside containing sialylated lacto-N-fucopentaose II. *J. Biol. Chem.* 1982;257:14365–14369
- [5] Vaidya Balendu Prakash., et al. "CA19-9 Lowering Effect of Ayurvedic Mineral Complex in the Patients of Chronic Pancreatitis". *EC Gastroenterology and Digestive System* 7.1 (2020): 01-05
- [6] Goonetilleke KS, Siriwardena AK. Systematic review of carbohydrate antigen (CA 19-9) as a biochemical marker in the diagnosis of pancreatic cancer. *Eur. J. Surg. Oncol.* 2007;33:266–270. doi: 10.1016/j.ejso.2006.10.004

- [7] Ferlay J, et al. Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int. J. Cancer*. 2015;136:E359–386. doi: 10.1002/ijc.29210
- [8] S SSavrikar and B Ravishankar. Introduction to 'Rasashastra' the Iatrochemistry of Ayurveda. *Afr J Tradit Complement Altern Med*. 2011; 8: 66–82
- [9] Prakash VB, Prakash VS, Sharma S, Tiwari S. Transformation of Copper into therapeutic mineral complex following principles of Rasa Shastra. *AAM*. Year: 2020, Volume: 9, Issue: 3: 162-170.
- [10] Shastri K., editor. *Rasa tarangini of Sadananda Sharma*, chapter 10, verse 25-28 & 44-46. 12th ed. MotilalBanarasidas; Varanasi: 2005. p. 226 & 229.
- [11] Anonymous. *RasatantrasaravaSiddhaprayogaSangraha*. Part: 1, KharaliyaRasayana no. 80. Krishna Gopal Ayurveda Bhavan; Ajmer: 1980. p. 444 – 445.
- [12] Acharya YT. editor. *SiddhayogaSangraha*. Shri Baidyanath Ayurveda Bhavan Ltd.; Jhansi: 1935. p. 42.
- [13] Chandra D and Mandal AK. Toxicological and Pharmacological Study of NavbalRasayan - A Metal Based Formulation. *Indian Journal of Pharmacology* 2000; 32: 369-371
- [14] Acharya YT. editor. *SiddhayogaSangraha*. Shri Baidyanath Ayurveda Bhavan Ltd.; Jhansi: 1935. p. 39.
- [15] Teng D, et al. Significant increased CA199 levels in acute pancreatitis patients predicts the presence of pancreatic cancer. *Oncotarget*. 2018 Jan 4;9(16):12745-12753. doi: 10.18632/oncotarget.23993. PMID: 29560106; PMCID: PMC5849170
- [16] Hammad N, et al. CA19-9 as a predictor of tumor response and survival in patients with advanced pancreatic cancer treated with gemcitabine based chemotherapy. *Asia Pac J Clin Oncol*. 2010 Jun;6(2):98-105. doi: 10.1111/j.1743-7563.2010.01290.x. PMID: 20565421; PMCID: PMC3865855
- [17] Vaidya Balendu Prakash., et al. "CA19-9 Lowering Effect of Ayurvedic Mineral Complex in the Patients of Chronic Pancreatitis". *EC Gastroenterology and Digestive System* 7.1 (2020): 01-05
- [18] Vaidya Balendu Prakash., et al. "Anti-Inflammatory Properties of a Processed Copper Complex in L-Arginine Induced Pancreatitis - Two Experimental Studies". *EC Gastroenterology and Digestive System* 6.7 (2019)