

# Exposing The Hidden Diabetes: Exploring Type 3C Diabetes Mellitus And Its Unique Challenges

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## Abstract:

Two primary classifications that have gained prominence in the constantly changing diabetes landscape are Type-1 and Type-2. Over the years, research, education, and public health campaigns have focused on these classifications due to their unique features and approaches to management. However, Type-3C Diabetes Mellitus, a condition that is less well-known and frequently misinterpreted, has long been overlooked in favor of its more well-known counterparts. The first step in treating Type-3C Diabetes Mellitus is understanding that it is a unique condition within the diabetes spectrum, associated with inflammation or damage to the pancreas, frequently resulting from chronic pancreatitis but also originating from a variety of other reasons. Chronic pancreatitis is a serious health problem with a significant mortality throughout the world. It is currently unknown how common Type 3c diabetes actually is. In India, the prevalence of Type 3c diabetes in people with chronic pancreatitis (CP) ranges from over 60% in cases of late-onset CP to over 17% in situations of early-onset CP. This review examines the special characteristics of Type-3C diabetes, talks about how common it is and the difficulties in diagnosing it, delves into its clinical symptoms and complications, clarifies the various facets of management and treatment, and considers future directions for this field of study.

**Key Message:** While addressing the challenges associated with Type-3C Diabetes Mellitus there is need of awareness among healthcare providers and the general public. Also, the development of clear diagnostic criteria, and an initiative-taking approach to screening individuals at risk for Type-3C diabetes is the need of the time.

**Key Word:** Chronic Pancreatitis (CP), Diabetes Mellitus, Hyperglycemia, Type-3C Diabetes Mellitus.

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## I. Introduction

Type 1 and type 2 are the two general classifications of diabetes, type 1 encompassing approximately five to ten percent of disorder, and type 2, encompassing 90-95%. These classifications, with their distinct characteristics and management strategies, have been the focal point of research, education, and public health campaigns for decades. Yet, a lesser-known and often misunderstood entity called as Type-3C Diabetes Mellitus, has long dwelled in the shadows of its more renowned counterparts. This comprehensive review aspires to shed light on the darkness surrounding Type-3C Diabetes Mellitus which embark on a journey to uncover the hidden facets of this condition, to understand its causes, its prevalence, its clinical manifestations, and the unique challenges it poses. Moreover, this review explores the intricacies of managing and treating Type-3C diabetes, which diverge from the conventional approaches used for Type 1 and Type 2 diabetes. <sup>(1, 2)</sup>

## II. Understanding Type-3C Diabetes Mellitus

Type-3C Diabetes Mellitus, frequently referred to as the "hidden diabetes," challenges conventional wisdom and demands the spotlight. The Type-3C Diabetes Mellitus stands as an enigmatic entity, lurking in the background, often misdiagnosed, or overlooked. While Type 1 diabetes is characterized by autoimmune destruction of insulin-producing beta cells and Type 2 diabetes by insulin resistance, Type-3C diabetes emerges because of a fundamentally different mechanism - damage or inflammation of the pancreas. This fundamental

distinction alone justifies its exploration, as it poses unique challenges in both diagnosis and management, which significantly differ from the well-documented strategies associated with Type 1 and Type 2 diabetes. The true prevalence of Type-3C diabetes is still unknown. In India, Type-3C diabetes affects individuals with chronic pancreatitis (CP) at a rate that varies from about 17% in cases of early-onset CP to more than 60% in cases of late-onset CP. Furthermore, compared to the west, India often has a younger age at which this illness manifests itself. Globally, chronic pancreatitis is a major health issue that is linked to a high rate of fatality. Our centre is in the south of India, where the prevalence of chronic pancreatitis is high at 114–200/100,000 people, compared to 4.2/100,000 in Japan, according to a recent consensus assessment on the disease's prevalence across the Asia-Pacific area. In India along with a few other Asian nations, the prevalence of CP is greater. <sup>(1-6)</sup> The most common underlying cause of Type-3C diabetes is chronic pancreatitis, condition with a painful and chronic inflammation of the pancreas. However, this is not the sole trigger, as other conditions such as pancreatic surgery, cystic fibrosis, as well as pancreatic cancer can also lead to the development of this distinct form of diabetes. What ensues is an intricate interplay of damage, inflammation, and dysfunction within the pancreas, culminating in a cascade of events that disrupt the body's ability to regulate blood sugar. Type-3C diabetes is the condition which is frequently misdiagnosed as Type 2 diabetes due to its onset in adulthood, or it may be masked by other underlying health issues. The challenges of diagnosis arise from the non-existence of definitive diagnostic criteria, resulting in an underestimation of its prevalence. Consequently, individuals afflicted with Type-3C diabetes may not receive the targeted care and management they require, often leading to complications that could have been prevented. <sup>(7, 8)</sup>

Unlike Type 1 diabetes, which stems from an autoimmune attack on the insulin-producing beta cells, and Type 2 diabetes, driven primarily by insulin resistance, Type-3C diabetes arises due to structural changes in the pancreas. These changes are brought about by various factors, with chronic pancreatitis taking the lead as the most common trigger. Chronic pancreatitis can result from various reasons, including heavy alcohol consumption, gallstones, genetic factors, or other medical conditions. Over the time, the ongoing inflammation in the pancreas leads to the destruction of pancreatic tissue, including the vital islet cells responsible for insulin secretion. The link between chronic pancreatitis and Type-3C diabetes is not merely linked; it is intrinsic. Chronic inflammation compromises the pancreas's ability to function optimally, affecting not only insulin production but also the secretion of other important digestive enzymes. This duality of dysfunction in the pancreas creates a complex interplay of metabolic disturbances, impacting both blood sugar regulation and digestion, which are hallmark features of Type-3C diabetes. <sup>(9)</sup> While chronic pancreatitis is the primary contributor to Type-3C diabetes, it's important to note that other conditions can also incite this unique form of diabetes. These include pancreatic surgery, pancreatic cancer, cystic fibrosis, and even autoimmune diseases that affect the pancreas directly. This variability in underlying causes further complicates the diagnosis and management of Type-3C diabetes. Understanding that multiple pathways can lead to its development underscores the need for a thorough evaluation of each patient's medical history. To differentiate Type-3C diabetes from its more commonly recognized counterparts, several distinguishing characteristics deserve attention. Firstly, Type-3C diabetes often presents later in life, typically in adulthood, which can lead to its misclassification as Type 2 diabetes. Additionally, individuals with Type-3C diabetes frequently have a history of the underlying condition, such as chronic pancreatitis, which serves as a significant clue to its diagnosis. Moreover, the severity and progression of Type-3C diabetes can vary widely. Some individuals may experience relatively mild glucose intolerance, while others develop severe and difficult-to-control diabetes. This heterogeneity highlights the necessity for personalized management strategies that address the specific needs of each patient. <sup>(7, 10)</sup>

### **III. The Role of Chronic Pancreatitis**

Chronic pancreatitis is a persistent inflammatory condition of the pancreas which plays a fundamental role in the pathogenesis of Type-3C Diabetes Mellitus. This often painful and debilitating condition manifests as recurrent episodes of inflammation that damage the pancreas over time. Chronic pancreatitis can result from a variety of underlying causes, and these causal factors may vary, with heavy alcohol consumption and gallstone disease as prominent contributors. The chronic inflammation characteristic of pancreatitis triggers a cascade of events within the pancreas that ultimately causes changes in its normal structure and function. The inflammatory response causes damage to pancreatic cells and surrounding tissue. Over time, this continuous damage results in a process called fibrosis, where scar tissue replaces healthy pancreatic tissue. Therefore, the pancreas undergoes major structural changes. <sup>(11, 12)</sup> Also, the most critical component of the pancreas is the islets of Langerhans which are small clusters of cells scattered throughout the organ. Within these islets, beta cells are responsible for producing insulin, a hormone that regulates blood sugar levels. In chronic pancreatitis, the destruction of pancreatic tissue affects these vital beta cells. The progressive damage on islet cells impairs the pancreas's capacity to secrete insulin, leading to a state of inadequate insulin production which causes diabetes in individuals. In addition to insulin production, the pancreas has another essential role in digestion. It produces

digestive enzymes necessary for breaking down food in the small intestine. Chronic pancreatitis disrupts this digestive process. The inflammation and subsequent fibrosis bargain the pancreas's ability to secrete these enzymes effectively. This may result in malabsorption of nutrients, leading to nutritional deficiencies and weight loss, supplementary complicates the clinical picture of individuals with Type-3C diabetes. <sup>(13, 14)</sup>

#### **IV. Distinguishing Characteristics of Type-3c Diabetes Mellitus**

Type-3C Diabetes Mellitus typically emerges in adulthood beyond the age of 15 years or younger children at which Type 1 diabetes commonly presents. This later onset can lead to misclassification, as it mirrors the age range in which Type 2 diabetes is more prevalent. The age factor adds an element of complexity in diagnosing and distinguishing Type-3C diabetes from other forms. Unlike the Type 1 or Type 2 diabetes, which can manifest independently the Type-3C diabetes is intimately linked to medical conditions such as chronic pancreatitis. Individuals diagnosed with Type-3C diabetes often have a history of chronic pancreatitis, providing a critical clue for healthcare professionals. Whereas Type 1 and Type 2 diabetes typically have no direct association with other chronic medical conditions. The clinical presentation of Type-3C diabetes can vary significantly from person to person some peoples may experience relatively mild disturbances in blood sugar regulation, while others develop severe and difficult-to-control diabetes. This variability can be attributed to the extent of damage and inflammation within the pancreas and the associated loss of beta cell function. In comparison with Type 1 and Type 2 diabetes which tend to have more consistent patterns of presentation. The heterogeneity of Type-3C diabetes extends to glucose control some peoples with Type-3C diabetes may be able to maintain better control of their blood sugar with minimal intervention, while others may require more aggressive management approaches. This distinguishes with the relatively predictable course of Type 1 and Type 2 diabetes, which can be more readily classified based on their typical progression. <sup>(15, 16)</sup> In contrast to Type 1 and Type 2 diabetes, which primarily affect insulin production and sensitivity the Type-3C diabetes extends its impact to pancreatic exocrine function. Chronic pancreatitis and related conditions not only impair insulin secretion but also disrupt the production of digestive enzymes. Consequently, individuals with Type-3C diabetes may experience malabsorption of nutrients and digestive complications alongside their diabetes, adding another layer of complexity to their condition. There is lack of well-defined diagnostic criteria for Type-3C diabetes compounds the challenges associated with this form of the disease. Unlike Type 1 and Type 2 diabetes, which have clear diagnostic guidelines, there is no standardized framework for identifying Type-3C diabetes. The absence of a universally accepted set of diagnostic criteria can result in underdiagnosis or misdiagnosis. Furthermore, the heterogeneous nature of Type-3C diabetes requires a more personalized approach to management. Healthcare providers must consider the unique characteristics and needs of each patient, ranging from glucose control to nutritional support and digestive health. This individualized approach sets it apart from the more standardized management strategies associated with Type 1 and Type 2 diabetes. <sup>(17, 18)</sup>

#### **V. Clinical Symptoms and Complications**

Understanding the clinical manifestations and complications of Type-3C Diabetes Mellitus is essential for healthcare providers to effectively manage and treat this unique form of diabetes. Type-3C diabetes presents a distinctive clinical profile, shaped by the underlying conditions and the damage to the pancreas that characterizes this subtype. As like other Type 1 and Type 2 diabetes, Hyperglycemia is a hallmark feature of Type-3C Diabetes Mellitus. Individuals with this form of diabetes experience persistently elevated blood sugar levels due to the impaired insulin secretion resulting from pancreatic damage. Hyperglycemia can manifest with classic diabetes symptoms, such as increased thirst (polydipsia) and frequent urination (polyuria). In severe cases, it may lead to diabetic ketoacidosis (DKA), a life-threatening condition characterized by high blood sugar levels, dehydration, and the presence of ketones in the urine. Prolonged hyperglycemia can lead to complications commonly associated with diabetes, such as diabetic retinopathy, neuropathy, and nephropathy. These complications, if not managed effectively, can further deteriorate an individual's overall health and well-being. <sup>(19, 20)</sup> The effects of pancreatic damage extend beyond glucose regulation. The digestive manifestations can include chronic abdominal pain, diarrhea, and malabsorption of nutrients. This occurs due to the impairment of exocrine pancreatic function, which results in inadequate secretion of digestive enzymes. As a result, individuals with Type-3C diabetes may experience difficulties digesting food and absorbing essential nutrients. Malabsorption of nutrients is a significant complication of Type-3C Diabetes Mellitus. It occurs due to the impaired digestion and absorption of essential nutrients, including fats, proteins, and fat-soluble vitamins (A, D, E, and K). Malnutrition can cause anemia, a condition characterized by a reduced number of red blood cells. This results in symptoms like fatigue, weakness, and pallor. Inadequate absorption of calcium and vitamin D can lead to weakened bones and osteoporosis, making fractures more likely. Nutritional deficiencies can compromise the immune system, increasing the risk of infections and reducing the body's ability to fight illness. <sup>(21)</sup>

Pancreatic cancer is one of the underlying conditions that can lead to the development of Type-3C Diabetes Mellitus. Pancreatic cancer is notorious for its asymptomatic or vague symptoms in its early stages, which often makes it challenging to diagnose until it has reached an advanced and less treatable stage. In the context of Type-3C diabetes, the relationship is often discovered when individuals are diagnosed with diabetes after being evaluated for symptoms related to the cancer, such as unexplained weight loss, jaundice, and abdominal pain. A late diagnosis of pancreatic cancer can significantly limit treatment options and overall prognosis. Also, this condition is one of the most aggressive malignancies. It tends to grow and spread rapidly, which poses significant challenges for treatment. Even with advances in cancer therapy, the overall survival rate for pancreatic cancer remains relatively low, particularly for cases diagnosed at advanced stages. Furthermore, individuals with Type-3C diabetes and underlying pancreatic cancer face complex treatment decisions. The presence of diabetes can affect the choice of cancer therapies, as treatments like chemotherapy may influence blood sugar levels and require careful management. Balancing the management of diabetes and cancer adds an additional layer of complexity to treatment plans. Living with Type-3C diabetes and its associated complications can have a substantial psychological impact. The presence of chronic symptoms, dietary restrictions, and the management of multiple medical issues can contribute to feelings of anxiety, depression, and decreased quality of life. <sup>(22, 23)</sup>

## **VI. Management and Treatment**

Effective management and treatment of Type-3C Diabetes Mellitus are essential to improve the quality of life and overall health of individuals living with this complex form of diabetes. Management approaches must address the underlying conditions, glucose control, digestive issues, and associated complications. The cornerstone of managing Type-3C Diabetes Mellitus is addressing the underlying medical conditions responsible for its development. These underlying conditions can vary, but the most common cause is chronic pancreatitis. For individuals with chronic pancreatitis chronic abdominal pain is a significant symptom of chronic pancreatitis the management of pain can be done by some medications and lifestyle modifications to reduce pain and discomfort. In cases where Type-3C diabetes is associated with pancreatic cancer, treatment strategies will primarily focus on the cancer itself. Treatment modalities may include surgery, chemotherapy, radiation therapy, or a combination of these approaches. The management of diabetes in these cases must be integrated with cancer treatment to ensure optimal blood sugar control while addressing the malignancy. <sup>(24, 25)</sup>

As this disease is associated with malabsorption of nutrients nutritional support like dietary modifications, including a low-fat diet, enzyme replacement therapy, and fat-soluble vitamin supplements can be helpful in disease management. Individuals with exocrine pancreatic insufficiency may require pancreatic enzyme replacement therapy to aid digestion and nutrient absorption. If chronic pancreatitis is due to alcohol consumption, cessation of alcohol and smoking is essential to prevent further damage to the pancreas. Furthermore, structural abnormalities in the pancreas, such as strictures, pseudocysts, and calcifications, may require medical or surgical interventions to address complications and improve pancreatic function. Managing blood glucose levels is a primary goal in treating Type-3C Diabetes Mellitus. This is particularly challenging due to the damage to the pancreas and the variability in insulin secretion. Depending on the severity of diabetes and the individual's needs, healthcare providers may prescribe oral antidiabetic medications or insulin therapy. Some individuals may require a combination of medications to achieve optimal blood sugar control. For those with severe insulin deficiency, insulin therapy may be necessary. This can involve various insulin delivery methods, such as injections or insulin pumps. Regular monitoring of blood glucose levels is essential to adjust medications and dietary choices. Continuous glucose monitoring systems (CGMs) can provide real-time data to help individuals make informed decisions. As there is variability in Type-3C diabetes presentations, management must be highly personalized. Healthcare providers should tailor treatment plans to the individual's specific needs and adjust them, as necessary. <sup>(26, 27)</sup>

Gastrointestinal symptoms are a common feature of Type-3C Diabetes Mellitus and can significantly impact an individual's quality of life. In cases of chronic diarrhoea, antidiarrheal medications may be prescribed to control bowel movements and reduce discomfort. A diet rich in fiber and adequate hydration can help regulate bowel movements and alleviate gastrointestinal distress. The emotional and psychological impact of Type-3C Diabetes Mellitus should not be underestimated. Individuals may benefit from mental health counseling or therapy to cope with the emotional challenges associated with living with a chronic condition and potential complications. Also, by joining support groups or connecting with others who have Type-3C diabetes can provide a sense of community and shared experiences. Stress management techniques, such as mindfulness, meditation, and relaxation exercises, can help individuals manage the stress associated with diabetes management. Regular follow-up with healthcare providers is essential to monitor the progress of treatment, adjust medications, and address any emerging issues. Individuals with Type-3C Diabetes Mellitus should have routine check-ups, including blood sugar monitoring and assessments of pancreatic function. <sup>(21, 23)</sup>

## VII. Conclusion

Type-3C Diabetes Mellitus begins with the recognition that it is a distinct entity within the diabetes spectrum, linked to damage or inflammation of the pancreas, often arising from chronic pancreatitis but also stemming from a range of other causes. The recognition of its underlying factors, the age of onset, and its variable clinical manifestations sets the stage for further exploration into the unique challenges posed by Type-3C diabetes. Type-3C Diabetes Mellitus is characterized by hyperglycemia, digestive symptoms, and variable clinical manifestations. It is also associated with a range of complications, including those arising from the underlying conditions, malnutrition, gastrointestinal issues, hyperglycemia-related complications, the potential link to pancreatic cancer, and the psychological impact on affected individuals. The diagnosis of Type-3C Diabetes Mellitus is complicated by the need to identify underlying conditions, the absence of standardized diagnostic criteria, the potential for misdiagnosis due to the age of onset, the similarity to Type 2 diabetes, the existence of asymptomatic cases, and the complexity of assessing pancreatic function. Addressing these diagnostic challenges requires increased awareness among healthcare providers, the development of clear diagnostic criteria, and an initiative-taking approach to screening individuals at risk for Type-3C diabetes. For management and treatment viewpoint it seems like complex approach that involves addressing underlying conditions, controlling blood glucose levels, dietary considerations, managing digestive symptoms, providing psychological support, regular monitoring, and follow-up, and integrating diabetes management with the treatment of associated conditions such as pancreatic cancer.

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