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A Review on Pancreatic Cancer: Berberine Effect

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Abstract

An extremely sensitive and oblong-shaped gland in the left hypochondrium and upper epigastrium of the abdomen is the pancreas. It's right behind your stomach. Due to their location, pancreatic diseases have long been notoriously difficult to study and comprehend. Although this is not always the case, particularly in developing nations, highly specialized equipment and expertise are frequently required for a comprehensive examination and diagnosis of pancreatic conditions. Routine, cost-effective imaging methods like trans abdominal ultrasound are not very accurate in diagnosing pancreatic diseases because the pancreas is frequently obscured by abdominal gas or other organs and cannot be fully visualized. In addition, the symptoms of pancreatic diseases tend to be vague, multifactorial, and nonspecific, which only 9.7% of the time results in a incorrect diagnosis. Costly, invasive, and requiring access to specialists who are well-versed in pancreatic disease, the use of more efficient diagnostic methods further complicates the diagnosis.

Keywords: Pancreatic cancer • Berberine • Intense pancreatitis

Introduction

The pancreas is a major organ that performs endocrine functions like the release of insulin and glucagon (basic chemicals that help regulate glucose homeostasis) as well as exocrine functions like the release of stomach-related compounds like amylase and lipase into the duodenum, which allows for the processing of nearly 25,000 kilograms of food consumed throughout our lifetime. Thanks to cutting-edge approaches in genetics, molecular biology, and brand-new in vitro and in vivo models of pancreatic diseases, the pancreas is now recognized as an organ that plays a life-sustaining role in the regulation and maintenance of normal physiological processes in various organ systems. As a result of these advancements, our understanding of the pancreas' physiology and pathophysiology has improved, allowing us to gain a deeper comprehension of previously obscure diseases and opening up brand-new possibilities for their treatment and prevention. Particularly, advancements in biotechnology have made it possible to successfully 3D bioprint pancreatic islet cells that kept their morphology, function, and viability even after being cultured for up to seven days. Patients would be able to achieve insulin independence and have significantly improved outcomes if the number of transplanted islet cells increased, as several islet cell infusions are typically required to achieve significant clinical benefits [1-4].

Literature Review

There are a variety of clinical and morphological manifestations of intense pancreatitis (AP), a quick and intense pancreatic disease. Patients with AP present with an abrupt onset of severe epigastric pain that frequently radiates to the back, stomach pain that worsens after eating, stomach tenderness, queasiness, regurgitation, fever, and rapid heartbeat. The revised Atlanta criteria are used to confirm the diagnosis in the event that at least two of the following three conditions are met: Abdominal discomfort; levels of lipase or amylase in the serum that are at least three times higher than the normal limit, as well as contrast-enhanced computed tomography (CT), transabdominal ultrasound, or, less frequently, radiographic evidence of AP. The severity of AP's clinical effects can be categorized into three categories: Local or systemic complications are absent in moderate, severe, or mild AP, whereas persistent organ failure, typically accompanied by infected pancreatic necrosis, is present in severe AP.

In North America, AP is the leading cause of gastrointestinal-related hospital admissions, with an annual incidence of 13–45 cases per 100,000 people. In addition, the number of AP admissions to hospitals has increased by 30% over the past ten years. Despite advances in diagnostics, 10–15% of AP cases remain undiagnosed or idiopathic. Due to the risk of sudden, unanticipated, and sometimes fatal complications, AP, regardless of severity, typically requires hospitalization and close monitoring. Importantly, it is important to point out that there are still very few options for treating AP, and many patients continue to have multiple reoccurrences that prolong inflammation, cause fibrosis or scarring, and permanently damage pancreatic tissues, resulting in chronic pancreatitis (CP). Despite the fact that every patient who presents with AP is admitted to the hospital, there are currently no effective pharmacologic treatments for the condition. Instead, the majority of treatment consists of supportive therapy, such as antiemetics and pain medication, particularly during the initial attack to identify the specific cause, intravenous fluid resuscitation to reduce inflammation and prevent dehydration. The two most common causes of AP are excessive alcohol consumption and gallstones.

Chronic pancreatitis (CP) is a fibroinflammatory condition characterized by recurrent episodes of pancreatic inflammation of varying intensities and durations that cause permanent function loss and irreparable damage. Repeated episodes of tissue inflammation result in chronic pain, exocrine and endocrine insufficiency, excessive fibrotic tissue buildup, significantly reduced quality of life and mental health. While clinical features like pain, nausea, vomiting, and steatorrhea are required to confirm the diagnosis of suspected or probable CP, imaging alone can be used to diagnose definitive CP. The definitive diagnosis of CP is based on radiographic evidence of calcifications, parenchymal and intraductal pancreatic fibrosis, and endocrine and exocrine insufficiency that causes diabetes, malnutrition, and steatorrhea. Symptoms of CP can have a significant impact on patients' quality of life (QOL), reducing life expectancy frequently [5-7].

Discussion

The location of premature trypsinogen activation and the fate of activated trypsin in the early stages of pancreatitis have piqued the interest of the scientific community. These two issues are very important. However, our knowledge of these phenomena is still incomplete. Because obtaining pancreatic tissues is invasive and may result in additional complications for the patient, pancreatic tissue is not readily available for examination during the early stages of pancreatitis in humans. This makes it extremely difficult to investigate these events in clinical pancreatitis. Berberine, or BBR, is a polyphenol that comes from plants and can be found naturally in many different plants and herbs. Traditional Chinese medicine and indigenous peoples of North America have used extracts from

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these plants for a wide range of ailments, including ulcers, infections, jaundice, and inflammation. BBR is a pentacyclic isoquinoline alkaloid and a quaternary ammonium salt in terms of its chemical structure. It is extremely challenging to dissolve in water due to its numerous non-polar rings. Due to its low solubility in water, BBR may not be absorbable by the small intestine.

Conclusion

This article provides a summary of the effects that BBR has on pancreatitis and pancreatic cancer. However, significant progress has been made toward enhancing bioavailability significantly. The advantages of BBR are clear in both animal and cell models of pancreatitis and pancreatic cancer. BBR administered intraperitoneally or intragastrically prevented and reversed damage to pancreatic tissue in animal models of pancreatitis. Because pancreatitis is a risk factor for the malignant transformation that leads to pancreatic cancer, BBR's ability to prevent and reverse pancreatitis may have promising implications for cancer prevention.

Acknowledgement

None.

Conflict of Interest

The authors declare that there is no conflict of interest associated with this manuscript.

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