

MINI REVIEW

Short Review of Our Work - “Chronic Metabolic Acidosis Destroys Pancreas” with Focus on the Functional Exocrine Pancreatic Disorders

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Dear Editor of the Journal of the Pancreas (JOP),

We deeply appreciate your publishing of our work- “Chronic metabolic acidosis destroys pancreas” in JOP (2014) [1]. We feel that our work can give the food for thought to many young researchers and health practitioners. A short review of our work may generate various questions and ideas for further investigations. In our work, we have focused on negative affects of the chronic metabolic acidosis on pancreatic function including:

- Premature activation of the proteases within the pancreas
- Diminishing the antimicrobial activity of the pancreatic juice
- Suppressing of the flushing out zymogens from the pancreas
- Precipitation of the aggressive bile acids
- Calcification

Authors believe that further research may provide more details of how the acidification destroys the pancreas and causes chronic pancreatitis. We would like to share some of our thoughts on this subject as follows:

Descriptions of symptoms of chronic pancreatitis such as pain, malabsorption syndrome, steatorrhea, and weight loss are found in almost all medical books, textbooks, and articles. The medical literature refers to these conditions as “pancreatic insufficiency”. It is known that these symptoms occur when only 10 % of the exocrine pancreatic function is left intact. This is not an “insufficiency.” It is a pancreatic “failure” when the therapeutic opportunities are very limited.

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The final stage of chronic pancreatitis does not develop overnight. There are usually 8 - 15 years between the first attack of acute pancreatitis and pancreatic failure after chronic pancreatitis. Similar to disorders of many other organs and systems, the pancreas initial diseased stage does not display any structural changes. However, after this stage, long-standing biochemical, biomechanical, neurohumoral, and inflammation factors lead to structural changes of the pancreas (chronic pancreatitis) and to lowering of the exocrine pancreatic function while developing many accompanying digestive diseases. However, when 90% of the pancreatic functional capacity is depleted, the pancreatic failure occurs with steatorrhea and malabsorption syndrome, resulting in a total crush of the digestive system and consequently of the entire human organism.

The great numbers of the digestive problems are directly or indirectly related to the function of the pancreas. Hence, a clinical diagnosis of gastrointestinal disorders de facto supposes pancreatic involvement. Nowadays, there is not an efficient and safe method for boosting the exocrine pancreatic function. Taking into account that chronic metabolic acidosis destroys the pancreas and entire digestion, might suggest another way to resolve the rampant gastrointestinal disorders and diseases.

There are no the classifications of pancreatic diseases that may satisfy and unify all specialists. All classifications make sense and are getting practical if they help primary care physicians or medical practitioners to postpone the development of the final stage of the pancreatic diseases, the condition when medical approaches usually are narrowed, and possibilities for treatment are restricted.

Taking into account that the pancreas is a key digestive organ, the authors attempt to propose a practical, functional clinical classification of exocrine pancreatic disorders, which can involve most of the gastrointestinal disorders and diseases. This functional clinical classification may assist primary care physicians, gastroenterologists and many health professionals in their everyday practice. This clinical classification may help a large number of patients suffering from gastrointestinal disorders to get help in either the early or compensated stages of their condition to avoid pancreatic failure [2].

The Functional Clinical Classification of Exocrine Pancreatic Disorders Subdivides Digestive Disorders and Diseases into Three Groups:

1. Acidic pancreas and bile
2. Pancreatic deficiency
3. Pancreatic failure

The Functional Clinical Classification of Exocrine Pancreatic Disorders takes the common digestive symptoms such as pain, gas, fullness, heartburn, stool, appetite and food sensitivity along with their frequency, quality and changes correlated with a combination of common clinical medical tests and diagnoses.

Acidic Pancreas and Bile

In everyday medical practice, the crowds of individuals with digestive symptoms consist of patients with the “acidic pancreas and bile” stage of exocrine pancreatic disorders. Their tests are usually normal, and most of these patients receive palliative symptomatic therapy.

The authors consider that the acidifying of alkaline digestive glands (pancreas and liver) decreases the digestive capacity of pancreatic juice and bile. Also acidifying makes these fluids corrosive and “aggressive”. In turn, it causes a large number of pathological refluxes. Undigested food is collected and fermented inside the intestines. Then, the improperly digested food irritates the intestinal walls causing gas, belching, bloating, abdominal cramps and pain, ulcers, constipation, etc. Nausea, vomiting, and diarrhea are natural detoxification reactions of the body to poor digestion.

Possible diseases and conditions associated with acidic pancreas and bile stage: functional dyspepsia, biliary dyskinesia, GERD, Sphincter of Oddi Dysfunction type III, IBS, Intestinal Dysbiosis (Candida-yeast overgrowth), etc.

Functional disorders of the pancreas are terra incognita in conventional medicine; there is little attention on the functional stage of exocrine pancreatic deficiency despite the pancreas being a key organ in normal digestion. In 1987, H. Worning from the University of Copenhagen, Denmark wrote in Digestion that the prevalence of pancreatic diseases as the cause of dyspepsia differs in clinical materials between 0 and 25-30%. In his view, pancreatic function and pancreatic disease are connected to different gastro-intestinal diseases [3].

The connection between impaired pancreatic function and functional gastrointestinal disorders such as functional dyspepsia, SIBO-small intestinal bacteria overgrowth, IBS increasingly attracts the attention of researchers and doctors [4-6].

Goepp J *et al.* (2014) found low pancreatic elastase (suggestive of exocrine pancreatic insufficiency) in 7.1% of the patients with IBS [7]. Another argument that low pancreatic function underlies dyspepsia and IBS is the positive effect of treatment of these disorders with pancreatic enzymes [8, 9].

Smith *et al.* (1991) reported abnormal Lundh tests in 27% of patients where conditions were classified as “functional dyspepsia.” They concluded, “Pancreatic disease may explain the symptoms of some patients with non-ulcer dyspepsia” [10].

It is clear that dyspepsia and functional dyspepsia, in particular, are common conditions globally, affecting most populations, regardless of location.”[11] Okada R *et al.* (2009) considered that mild functional pancreatic disorders might trigger some cases with unexplainable chronic dyspepsia [12].

Eva Lindström *et al.* (1990) suggested that altogether, 66% of the patients with abdominal pain had morphological and functional evidence of pancreatic affection [13].

Some researchers agree that differentiation between functional dyspepsia and early chronic pancreatitis is difficult [14]. Early stages of chronic pancreatitis and decreasing of exocrine pancreatic function are commonly misdiagnosed.

“Early chronic pancreatitis remains a diagnostic challenge as there is no gold standard for the diagnosis and pancreatic biopsy is risky and impractical. Reported data on the incidence and prevalence of chronic pancreatitis are unreliable and highly variable. Chronic pancreatitis is clearly under – diagnosed” [15].

The diagnosis of the beginning of the pancreatic disorders might be missed in clinical practice because symptoms of severe exocrine pancreatic deficiency (malabsorption syndrome and maldigestion) are not specific to the early stages of chronic pancreatitis. As a result, early chronic pancreatitis is rarely suspected when pain is mild or absent and when symptoms are unspecific (“dyspepsia”) in the absence of steatorrhea.

Pancreatic Deficiency

Possible diseases and conditions associated with pancreatic deficiency: clinical or subclinical episodes of acute pancreatitis, chronic pancreatitis, gastric ulcers, duodenal ulcers, duodenitis, Sphincter of Oddi Dysfunction type II or III, gallbladder disorders (inflammation, stones, sludge, parasites), conditions after gallbladder removal and some surgeries on the upper GI tract, considerable intestinal dysbiosis (Candida-yeast overgrowth, Small Intestine Bacterial Overgrowth), IBD (Crohn’s Disease, Ulcerative Colitis), Celiac Diseases, Cystic Fibrosis (early stage), NIDDM- noninsulin-dependent diabetes mellitus, non-alcoholic fatty pancreas, etc.

In almost all these diseases, there is a constant pancreas involvement that results in structural damage and diminished function including different severities of chronic pancreatitis. Nutritional scientists have found that chronic metabolic acidosis is a common condition in modern societies and acidemia causes the development of many chronic degenerative diseases and accelerates the aging process [16, 17].

Acidemia is the hidden menace and is one of the “diseases of civilization”. Acidemia strikes most of the world’s population as a price for urbanization and a western lifestyle. If we consider the predominance of the acid-forming, processed foods, the consumption of alcohol and acidosis-producing medications, it can be presumed that the prevalence of low-grade, chronic metabolic acidosis can occur in epidemic proportions [18].

If chronic metabolic acidosis destroys the pancreas, it supposes epidemic proportion of acidic pancreas and bile, pancreatic deficiency and pancreatic failure stages of chronic pancreatitis. Considerable scientific research and practical evidence support this idea.

Ake Andren-Sandberg, Philip D Hardt (2005) in the review of the Second Giessen International Workshop on Interactions of Exocrine and Endocrine. Pancreatic Diseases' that was published in JOP gave some facts about the prevalence of chronic pancreatitis. Chronic pancreatitis is much more frequent than previously believed. 5.3% of non-diabetics had chronic pancreatitis, but 11.2% of diabetics had chronic pancreatitis. Pancreatitis or pancreatic fibrosis appear to be frequent in Western societies and might affect more than 10% in population-based studies [15].

In a study of autopsy cases, Olsen *et al.* [19] found that only 2 cases (0.5%) had been diagnosed with clinical chronic pancreatitis, but 13% actually had chronic pancreatitis. Hardt PD *et al.* (2008) “The incidence of diabetes caused by exocrine pancreatic disorders appears to be underestimated and may comprise 8% or more of the general diabetic patient population”. Some physicians refer to this condition as diabetes type 3 [20].

The prevalence of chronic pancreatitis may be much higher in the general population than previously estimated and diabetes mellitus secondary to chronic pancreatitis could be more common, which would explain the frequent finding of exocrine pancreatic deficiency in diabetics [15, 20].

Nowadays there is the epidemic proportion of metabolic syndrome and nonalcoholic fatty liver disease (NAFLD) in the world population. More evidence show the association between NAFLD, BMI and fatty pancreas with diminishing exocrine pancreatic function [21, 22].

Pancreatic Failure

Possible diseases and conditions associated with pancreatic failure: the final stage of chronic pancreatitis, Cystic Fibrosis, liver cirrhosis, cancer, etc.

All of the three stages: acidic pancreas and bile, pancreatic deficiency, and pancreatic failure have different diagnostic criteria and therapeutic approaches. Attention to proper acid-base balance may be beneficial in all of the three stages. Nowadays, a pandemic of interrelated metabolic acidosis, low pancreatic function, and intestinal dysbiosis create a vicious circle and aggravate the clinical digestive symptoms picture.

Finally, we believe that Journal of the Pancreas (JOP) plays a major role to unite various medical practitioners and researchers with different viewpoints on the development, diagnose and treatment of the pancreatic diseases. It is a great contribution to uncovering many secrets of this vital organ that is hidden deep in the abdomen.

Conflict of interest

Authors have no conflicts of interest

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