

## THE CORRELATIONS BETWEEN TROPHOLOGY STATUS AND THE MAIN DISEASE CHARACTERISTICS OF PATIENTS WITH BILIARY GENESIS CHRONIC PANCREATITIS

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### **Abstract:**

*Chronic or long-term pancreatitis is an inflammation of pancreas that impairs our body's ability to digest food and regulate blood sugar. Alcohol abuse is the most frequent cause of chronic pancreatitis, but autoimmune diseases, gallstones, cystic fibrosis, and several other conditions can also cause it. The damage caused by chronic pancreatitis is usually permanent. The pain and symptoms can usually be managed with proper treatment. The treatment for chronic pancreatitis includes medication, endoscopic therapies, and sometimes surgery. Chronic pancreatitis is an inflammation of your pancreas that doesn't improve over time. The objective of the study was to evaluate correlations between indicators of trophological status and the main disease characteristics in patients with biliary genesis chronic pancreatitis. The provided correlation and regression analysis has proved that the age of patients, disease duration, and functional ability of the pancreas determined by faecal  $\alpha$ -elastase level and structural state of the pancreas according to ultrasound criteria points and by the method of shear wave elastography are predictors of anaemia, iron deficiency, immunodeficiency, hypoproteinaemia, mineral and vitamin deficiencies development in patients with CP. In discussion is presented possibilities of yoga applications possibilities in patients with chronic pancreatitis.*

### **Keywords:**

*chronic pancreatitis, trophological status, anaemia, correlation and regression analysis, shear wave elastography.*

## INTRODUCTION

The pancreas is an organ located behind stomach. It produces enzymes, which are special proteins that help digest food. Also it produces hormones that control the level of sugar in bloodstream. Pancreatitis occurs when your pancreas becomes inflamed. Pancreatitis is

considered acute when the inflammation only lasts for a short period of time. Pancreatitis is chronic when it keeps coming back or when the inflammation doesn't heal for months or years. Chronic pancreatitis can lead to permanent scarring and damage. Calcium stones and cysts may develop in pancreas, which can block the duct, or tube, that carries digestive

enzymes and juices to the stomach. The blockage may lower the levels of pancreatic enzymes and hormones, which will make it harder for body to digest food and regulate the blood sugar. This can cause serious health problems, including malnutrition and diabetes (Dítě, 2001).

Chronic or long-term pancreatitis is an inflammation of pancreas that impairs our body's ability to digest food and regulate blood sugar. Unlike acute, or short-term, pancreatitis, chronic pancreatitis doesn't get better over time. Alcohol abuse is the most frequent cause of chronic pancreatitis, but autoimmune diseases, gallstones, cystic fibrosis, and several other conditions can also cause it. The damage caused by chronic pancreatitis is usually permanent. The pain and symptoms can usually be managed with proper treatment. The treatment for chronic pancreatitis includes medication, endoscopic therapies, and sometimes surgery. Chronic pancreatitis is an inflammation of your pancreas that doesn't improve over time (Healthline, 2017).

There are numerous different causes of chronic pancreatitis. The most common cause is long-term alcohol abuse. Approximately 70 percent of cases are linked to alcohol consumption. Autoimmune diseases can also cause the chronic pancreatitis. Autoimmune disease occurs when the body mistakenly attacks your healthy cells and tissues. Inflammatory bowel syndrome, which is inflammation of the digestive tract, and primary biliary cirrhosis, which is a chronic liver disease are associated with chronic pancreatitis. Other causes include a narrow pancreatic duct, which is the tube that carries enzymes from the pancreas to the small intestine. The other

reason of pancreatitis is a blockage of the pancreatic duct by either gallstones or pancreatic stones, cystic fibrosis, which is a hereditary disease that causes mucus to build up in your lungs, genetics and a high level of triglyceride fats in your blood, which is called hypertriglyceridemia (Dítě, 2001).

What are risk factors and who is at risk for getting chronic pancreatitis? Abusing alcohol increases your risk of developing chronic pancreatitis. Smoking is believed to increase the risk of pancreatitis among alcoholics. In some cases, a family history of chronic pancreatitis can increase your risk. Chronic pancreatitis most frequently develops in people between the ages of 30 and 40. The condition is also more common among men than women. Children living in tropical regions of Asia and Africa may be at risk for developing tropical pancreatitis, which is another type of chronic pancreatitis. The exact cause of tropical pancreatitis is unknown, but it may be related to malnutrition (Healthline, 2017).

Chronic pancreatitis has different symptoms. At first, you may not notice any symptoms. Changes in the pancreas can become quite advanced before you begin to feel unwell. When symptoms occur, they may include: pain in upper abdomen, diarrhoea, fatty stools, which are loose, pale, and don't flush away easily, nausea and vomiting, unexplained weight loss, excessive thirst and fatigue. You may experience more severe symptoms as the disease progresses, such as: pancreatic fluids in your abdomen, jaundice, which is characterized by a yellowish discoloration in your eyes and skin, internal bleeding and intestinal blockage. Painful episodes can last for hours or even days. Some

people find that eating or drinking can make their pain worse. As the disease progresses, the pain may become constant (Dítě, et al 2011).

Chronic pancreatitis is diagnosed difficult. During the early stages of chronic pancreatitis, changes in the pancreas are difficult to see in blood tests. For this reason, blood tests typically aren't used to diagnose the disease. However, they may be used to determine the amount of pancreatic enzymes in your blood. Blood tests may also be used to check kidney and liver function. Your doctor might ask you for a stool sample to test for levels of fat. Fatty stools could be a sign that your body isn't absorbing nutrients correctly. Imaging tests are the most reliable way to make a diagnosis. Following studies should be done on the abdomen to look for signs of inflammation: X-rays, ultrasounds, CT scans, MRI scans, and endoscopic ultrasound (Chronic pancreatitis 2017 (Healthline, 2017)).

Treatment for chronic pancreatitis focuses on reducing the pain and improving the digestive function. The damage to the pancreas can't be undone, but with the proper care, you should be able to manage most of your symptoms. Treatment for pancreatitis can include medication, endoscopic therapies, or surgery. Possible medications include: pain medication, artificial digestive enzymes if your enzyme levels are too low to digest food, insulin if you have diabetes, steroids if you have autoimmune pancreatitis, which occurs when body's immune system attacks the pancreas. Some treatments use an endoscope to reduce pain and get rid of blockages. It allows removing pancreatic stones, place small tubes called stents to

improve flow, and close leaks. Surgery is not necessary for most people. However, if you have severe pain that isn't responding to medication, removing part of your pancreas can sometimes provide relief. Surgery may also be used to unblock your pancreatic duct or to widen it if it's too narrow. It is important to avoid alcohol after you've been diagnosed with chronic pancreatitis, even if alcohol wasn't the cause of your illness. You should also avoid smoking because it can increase your risk of developing pancreatic cancer. You may need to limit the amount of fat in your diet and take vitamins. Chronic pancreatitis has the potential to cause numerous complications. You're at greater risk of developing complications if you continue to drink alcohol after you've been diagnosed. Nutrient malabsorption is one of the most common complications. Since your pancreas isn't producing enough digestive enzymes, your body isn't absorbing nutrients properly. This can lead to malnutrition. The development of diabetes is another possible complication. Pancreatitis damages the cells that produce insulin and glucagon, which are the hormones that control the amount of sugar in your blood. This can lead to an increase in blood sugar levels. About 45 percent of people with chronic pancreatitis will get diabetes (Dítě et al, 2011).

Some people will also develop pseudocysts, which are fluid-filled growths that can form inside or outside of your pancreas. Pseudocysts are dangerous because they can block important ducts and blood vessels. They may become infected in some cases. The outlook depends on the severity and underlying cause of the disease. Other factors can affect your chances of recovery,

including your age at diagnosis and whether you continue to drink alcohol or smoke cigarettes. Prompt diagnosis and treatment can improve the outlook (Healthline, 2017).

In the long course of chronic pancreatitis (CP), there is an imbalance between patient's intake of nutrients and her need in them. Trophological insufficiency (TI), which is the lack of nutrients of organic and inorganic origin that a human body needs to live, develops. (Babinets 2014, Löhr, Klöppel, 2008). TI is polynutrient in its composition, i.e. lacking macro components (proteins, fats, carbohydrates) and micro components (vitamins and some chemical elements) in different ratios (Babinets 2014). TI occurs because of both exogenous agents (inadequate intake of nutrients from food, caused by a sparing diet a patient has to follow due to pain syndrome, as well as irrational diet due to alcohol abuse, socio-economic reasons and low medical awareness) and endogenous agents (malutilization of nutrients in a patient's body) (Dominguez-Muñoz, 2005).

## OBJECTIVE

The objective of the study was to evaluate correlations between indicators of trophological status and the main disease characteristics in patients with biliary genesis chronic pancreatitis.

## MATERIAL AND METHODS

115 patients with biliary genesis CP were examined comparable to etiological factor and socio-economic conditions and nutrition (normotrophic food per 5 times a day without aggressive food (fatty, spicy,

sour, fried products). Also an effect of the alcohol factor was excluded. 20 young healthy people were included in the control group. Among patients with CP 75 were women and 40 were men, the average age of patients was ( $52.4 \pm 3.2$ ) years. The duration of the disease was ( $12.8 \pm 3.1$ ) years.

The diagnosis of CP was made based on a generally accepted classification in Ukraine suggested by the Research Institute of Medical Science of Ukraine, which corresponds to the Marseille-Cambridge classification according to the "Unified clinical protocols of primary, secondary (specialized) medical care and medical rehabilitation of patients with chronic pancreatitis", approved by the Act of Ministry of Healthcare of Ukraine as of 10.09.2014 under # 638).

Statistical processing was performed by correlation analysis. The strength of communication between clinical laboratory parameters of trophological status and main clinical characteristics of the disease was evaluated according to the following limits: 0, 10-0, 29 – weak intensity; 0, 30-0, 59 – moderate intensity; 0, 60-0, 99 - strong intensity.

## RESULTS AND DISCUSSION

We considered appropriate to analysing possible predictor impact of the following general clinical CP characteristics (age, duration of the CP course, level of faecal  $\alpha$ -elastase), which would allow to reliably evaluate the functional ability of pancreas as enzyme laboratory of the organism, as well as the structural characteristics of pancreas based on ultrasound points system and by the method of shear wave elastography and the

TS parameters. In the table the results of the correlations between clinical laboratory

parameters of TS and main clinical characteristics of the disease are presented.

**Table 1** Correlation between trophological status indicators in patients with CP and the main characteristics of the disease (N=115, Males 40, Females 75).

| Pair in regression connection  | Age of patient years      | Duration of CP years      | Level of $\alpha$ -elastase mg/g | Ultrasound points         | SWE kPa                   |
|--|---------------------------|---------------------------|----------------------------------|---------------------------|---------------------------|
| Red blood cells, $\times 10^{12}/l$  | -0.670<br>n=115<br>p<0.05 | -0.502<br>n=115<br>p<0.05 | 0.517<br>n=115<br>p<0.05         | -0.357<br>n=115<br>p<0.05 | -0.512<br>n=115<br>p<0.05 |
| Haemoglobin, g/l   | -0.502<br>n=115<br>p<0.05 | -0.333<br>n=115<br>p<0.05 | 0.302<br>n=115<br>p<0.05         | -0.330<br>n=115<br>p<0.05 | -0.603<br>n=115<br>p<0.05 |
| Sera iron, mmol/l  | -0.613<br>n=115<br>p<0.05 | -0.495<br>n=115<br>p<0.05 | 0.375<br>n=115<br>p<0.05         | -0.289<br>n=115<br>p<0.05 | -0.509<br>n=115<br>p<0.05 |
| Transferrin, mg/dL   | 0.733<br>n=115<br>p<0.05  | 0.640<br>n=115<br>p<0.05  | -0.535<br>n=115<br>p<0.05        | 0.434<br>n=115<br>p<0.05  | 0.598<br>n=115<br>p<0.05  |
| Total protein, g/l   | -0.569<br>n=115<br>p<0.05 | -0.417<br>n=115<br>p<0.05 | 0.570<br>n=115<br>p<0.05         | -0.307<br>n=115<br>p<0.05 | -0.601<br>n=115<br>p<0.05 |
| Ascorbic acid, mg/l  | -0.449<br>n=115<br>p<0.05 | -0.386<br>n=115<br>p<0.05 | 0.425<br>n=115<br>p<0.05         | -0.317<br>n=115<br>p<0.05 | -0.511<br>n=115<br>p<0.05 |
| Retinol, mmol/l  | -0.437<br>n=115<br>p<0.05 | -0.429<br>n=115<br>p<0.05 | 0.420<br>n=115<br>p<0.05         | -0.286<br>n=115<br>p<0.05 | -0.612<br>n=115<br>p<0.05 |
| Tocopherol, mmol/l   | -0.536<br>n=115<br>p<0.05 | -0.328<br>n=115<br>p<0.05 | 0.493<br>n=115<br>p<0.05         | -0.305<br>n=115<br>p<0.05 | -0.498<br>n=115<br>p<0.05 |
| Note:<br>n – number of pairs in the correlation analysis;<br>p – degree of reliability of correlation. |                           |                           |                                  |                           |                           |

According to the received information it has been found, that there are direct correlation ties of moderate and strong intensity between anaemic syndrome levels of total protein, vitamins and age, disease duration, faecal  $\alpha$ -elastase indicators, ultrasound data in points and indicators of SWE. All examined trophological status parameters were direct correlation ties of moderate intensity between faecal  $\alpha$ -elastase indicators. Found data are

evidence in significant predictor influence of age, CP duration, severeness of ESI of pancreas in terms of faecal  $\alpha$ -elastase level and ultrasound point's parameter on the onset and severeness of trophological violations.

Comparative relationships analysis between the structural state of the pancreas (according to the ultrasound in points and method ESI) and parameters of the TS showed the presence of strong ties with the

ESI indicators, that demonstrated higher diagnostic value of this method.

Discussion to yoga applications for the quality of life improving in patients with chronic pancreatitis

According Lewith, the pain that develops in chronic pancreatitis is often severe, chronic, aggravated by meals and may be present continuously including at night. In some patients the pain is so severe that they develop a fear for eating and, as a consequence, they lose significant amounts of weight. The pain may begin gradually; however, in many patients over time they develop into continuous pain. Therapy of chronic pancreatitis rests on five arms: Avoidance of alcohol, treatment of pain, replacement therapy for exocrine and endocrine insufficiency and adequate nutrition. Alcohol withdrawal improves pain and the patient's compliance. It also seems to retard the chronic inflammatory process. Yoga as a clinical intervention has been associated with a variety of physical and psychological health outcomes such as improved mood and reduced symptoms of anxiety and depression (Lewith, 2000).

Theory of homeostasis can be considered as a synonym of yoga. Classical yoga includes techniques of developing a healthy lifestyle, which reflect the latest modern knowledge about oxidative stress, about the importance of acid-base balance, about the interconnectedness of psychosomatic effects on the organism. Yoga influences on increasing of the functional ability of human psyche and resistance to environmental stress. Yoga is generally a safe therapeutic intervention and effective to attenuate other health-related symptoms. Researchers aimed at systematically reviewing and meta-

analysing the effectiveness of yoga interventions. Treatment effects of yoga could be improved in well-designed future studies (compare with Krejčí, 2016 and Boehm, Ostermann, Milazzo, Büssing, et al., 2015).

While findings from the current study provide preliminary results, indicating that yoga can be used as an intervention to reduce stress and anxiety in patients of chronic pancreatitis, proper training and knowledge of the principles that guide the practice of yoga must be thoroughly understood and demonstrated by any recreation therapist who would like to use this intervention with clients (Sareen, Kumari, Singh-Gajebasia, Kaur-Gajebasia, 2007).

Büssing, Michalsen, Khalsa, et al (2015) following main categories of randomized clinical trials are reported that positive benefits of yoga interventions to reduce fatigue were proved in analysed studies in healthy persons as well as in patients with cancer, multiple sclerosis, diabetes, chronic pancreatitis, asthma, and fibromyalgia.

Even 20 years ago research team of Kabat-Zinn, Wheeler, et al. (1998) aimed to determine the effectiveness of yoga on quality of life in patients of chronic pancreatitis. The patients were randomized to two groups. The control group continued their usual care as directed by their physicians. Patients in the yoga group, in addition, received biweekly yoga sessions for 12 weeks. The patients' demographic and health behaviour variables were assessed before and after the yoga programme using Medical Outcomes Short Form (SF-36) for quality of life, Profile of Mood States for assessing mood and Symptoms of Stress Inventory for

measuring stress. A total of 60 patients were monitored. 30 patients were randomized to the yoga group and 30 to the control group. They ranged in age from 41 to 69 years (mean, 50). All participants were diagnosed with chronic pancreatitis and were taking pain and anxiety medications. 86% of the patients were males and 90% of them were alcoholic at some stage of their life. All data were analysed using the SPSS package. An alpha level for a significant difference was set at 0.01 because of the number of variables. The yoga program was designed to complement the management of pain and anxiety based on a sequence of yoga postures, a yoga program was designed for participants. The sessions were held in early morning. Significant improvements were seen in overall quality of life, symptoms of stress, mood changes, alcohol dependence and appetite after the 12 weeks period apart from the general feeling of well-being and desire to continue with the programme in future in the yoga group. The results provided evidence that a relatively brief mindfulness meditation and exercise based stress reduction programme could effectively improve the quality of life, mood disturbance and stress related symptoms in patients with chronic pancreatitis, consistent with other investigations of similar interventions in different populations (Kabat-Zinn, Wheeler, et al. 1998).

We can discuss that yoga programmes may be very effective on improving the quality of life in patients of chronic pancreatitis. It should be open a way to monitoring and yoga practicing in SPA and wellness centres to promote the healing processes in patients with chronic

pancreatitis. In the Czech Republic, despite yoga's wide popularity there, limited numbers of randomized, controlled yoga studies using objective quantitative outcome measures in patients with chronic pancreatitis were published in last five years.

Stress reduction and anxiety management programs could be useful for any disease because they help to create a supportive environment, in which the individual may have reduced anxiety. It is reasonable to conclude that even greater benefits may be obtained by participants who continue to practice over time and adopt yoga as part of their daily life.

## CONCLUSIONS

According to the data of correlation and regression analysis, it has been proved that the age of patients, disease duration, functional ability of the pancreas in terms of faecal  $\alpha$ -elastase and structural state of the pancreas by the criteria of ultrasound in points and by the method of SWE are predictors of the development and progression of anaemia, hypoproteinaemia and vitamin deficiencies for the patients with CP of biliary genesis. That's should be considered in clinical practice to form the most effective medical complex.

Most standard therapies for chronic pancreatitis frequently carry adverse effects, particularly in older patients, further compromising their quality of life. NSAIDs carry a 2- to 5-fold increased risk of gastrointestinal bleeding, which increases with age (Johnson, Day, 1991). When yoga was added to the standard therapy, patients tended to take fewer medications. Yoga offers a very distinct approach to pain. It brings awareness to the

body, especially to the parts that are in pain. Yoga helps individuals with or after chronic pancreatitis become more accepting of their body and less judgmental and reactive to pain.

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