Naturally Inspired: Understanding How Pomegranate Prevents Pancreatic Disorders

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Theme:

This article talks about the potential of pomegranate in reducing the risk and symptoms of pancreatic disorders. A variety of stress pointspresent in our environment and lifestyle inflicts damage to the pancreas, an organ that plays a central role in digestion and maintenance of blood sugar levels. In many patients, by the time this damage is diagnosed, the disease is too far progressed. Our study shows that incorporation of pomegranate supplement in our diet can protect from such consequences and decrease the risk and complications of diseases like diabetes and pancreatitis.

About problems and remedies:

While growing up, my grandmother had a "*nuskha*" for every disease. She would give us a home brewed "*kadha*" when we were down with a cold, a ginger-honey paste was made for cough, and bitter gourd juice was made when my father was diagnosed with diabetes mellitus. When I started my journey of scientific inquiry, these little tricks and concoctions stayed with me. As I read about the complexity of diseases, I was surprised how these simple age-old remedies still work given our current lifestyle. Today, we are rediscovering traditional medicine. If you take a walk down the aisle of any supermarket you would see a plethora of natural extracts being sold for different purposes. The question is whether these are effective enough, whether Nature really has the answers to our current-day problems.

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We are exposing our bodies to a variety of stresses every day. Excessive sugar intake, reduced physical exercise, increased consumption of processed and preserved food, consumption of adulterated food, alcohol abuse, cigarette smoking and many more such practices have become an integral part of our day-to-day life. All these factors cause oxidative stress and inflammation in our system. One of the direst outcome is pancreatic damage and eventually pancreatitis which is characterized by abdominal pain, indigestion and diabetes. Our group has been striving to understand how oxidative stress and inflammation orchestrate the progression of pancreatic disorders, and whether the consumption of a pomegranate extract can help reduce this damage.

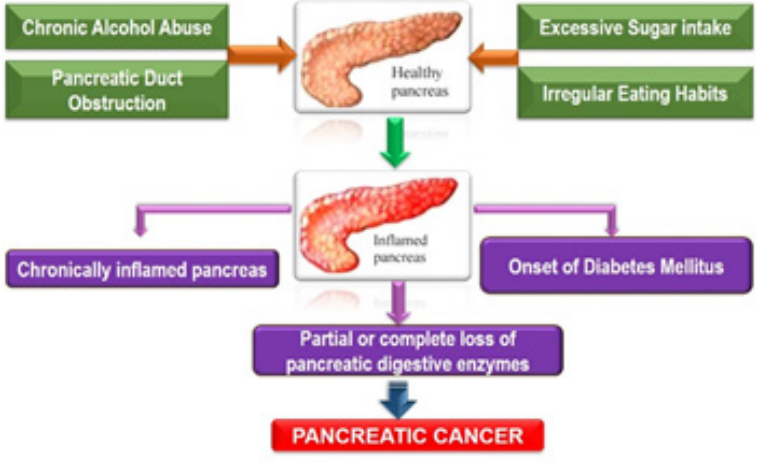


Figure: Pancreatic Inflammation – Causes and Concerns

The reason for choosing pomegranate supplementation is that pomegranate is packed with a booster of antioxidants and according to a study conducted by Seeram*et al.* in 2008, pomegranate juice has up to 20% more antioxidant potential than commonly consumed beverages like green tea, grape juice, etc.

Piecing out the puzzle:

To achieve our objectives, we created animal disease models by treating mice with a bacterial endotoxin that causes inflammation. This model allowed us to study the natural physiology of the disease. We also had a separate group of animals who were being given pomegranate extract supplement and were exposed to the inflammation trigger.

We studied various parameters to assess if there was damage inflicted to the pancreas. Pancreas is an organ that manufactures and secretes digestive enzymes which help to breakdown food into simpler components. It also secretes insulin, a key hormone regulating the glucose balance in our bodies. When pancreatitis sets it in, the digestive juices made by the pancreas starts to digest the organ itself. The amount of the digestive enzymes like amylase increase in peripheral blood. Also, there is a decrease in insulin production which leads to increased blood sugar. We observed

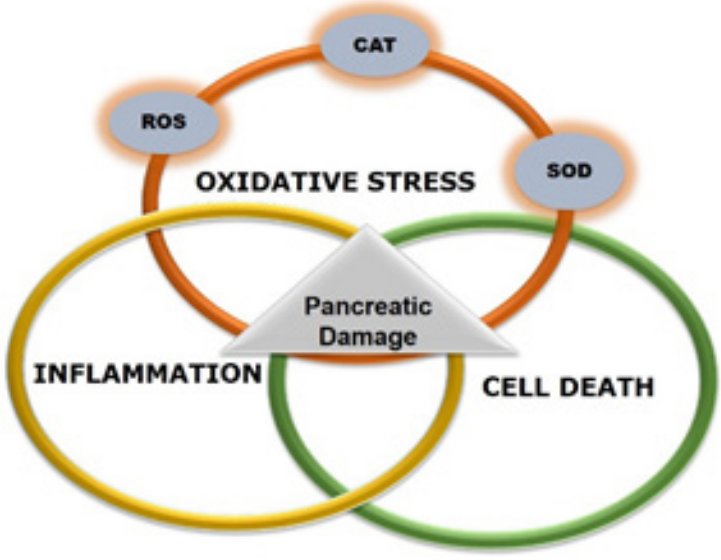


Figure: Pancreatic damage is orchestrated by oxidative stress, inflammation and consequent cell death

that in diseased mice the levels of amylase were high and insulin production was impaired. Upon pomegranate supplementation, the blood insulin goes up and amylase comes back to near-normal levels. We also assayed the levels of common enzymes that are routinely used as diagnostic markers for toxicity, like alkaline phosphatase, lactate dehydrogenase, etc. We saw that diseased individuals had higher than normal levels of these enzymes in blood indicating breakdown of body's metabolic machinery. Pomegranate intake was able to reduce the expression of these enzymes indicating improved metabolic health.

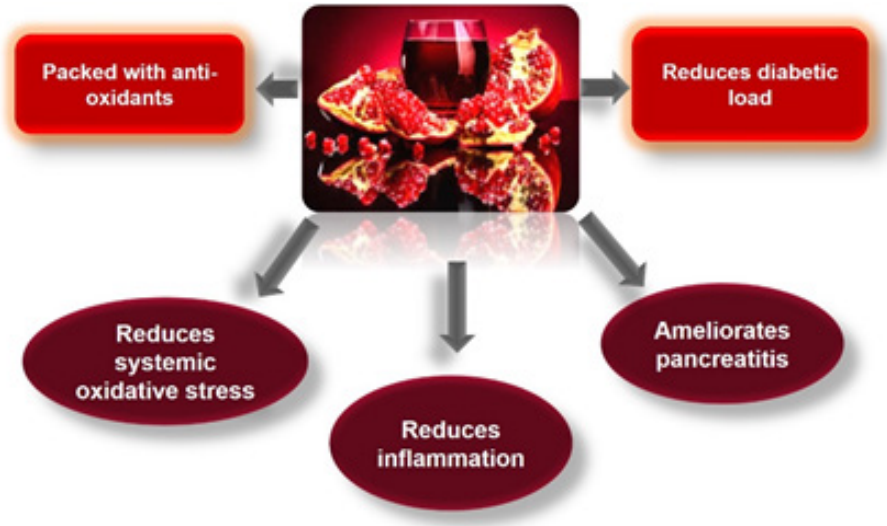
We now needed to understand the role of oxidative stress in all of this because we were proposing the use of pomegranate based on its anti-oxidant potency. Oxidative stress, basically, is an imbalance between the generation of reactive oxygen species and a biological system's capacity to get rid of these reactive species and repair the damage they cause. The process of generation of these reactive oxygen species, or ROS as we call them is inevitable to our life process. When we breathe, we take in oxygen which is used to burn the food that we eat in order to generate energy. In addition when we are infected, our immune system uses oxidative burst, much like a mini bomb going off, in order to kill the infecting agent. Both these processes, generate ROS. A biological system is well-equipped with detoxification machinery which helps get rid of this ROS generated as a result of basic metabolic activities. However, when we are constantly faced with excessive stressors mentioned earlier, our body is no longer able to clear ROS. This excessive ROS causes oxidative stress and left unchecked results in organ damage.

In our study we analyzed key molecules which form the body's defense line-up against oxidative stress. We saw that in the diseased animals, there was extensive ROS in the pancreatic tissues. This was coupled with a failure of the defense enzymes like Superoxide Dismutase (SOD), Catalase (CAT), etc.

In subjects that had received pomegranate supplementation the ROS generation was substantially less and the levels of defense enzymes were much higher. This led to the understanding that the components of the pomegranate fruit act like a sponge in soaking up excessive ROS in a system, thereby helping our body fight against the damages that it would otherwise cause.

We also looked at a process called apoptosis, which results in the death of cells in a tissue. This is a process by which unhealthy cells commit suicide in order to maintain physiological homeostasis. According to our data, oxidative stress increases cellular death and, therefore, causes organ damage. Incorporation of pomegranate extract in the diet mitigates this stress and prevents cells from dying out, thus offering relief from pancreatic damage.

Taken together our data indicates that inflammation and oxidative stress affects our metabolism adversely. These induce death of the pancreatic cells and causes pancreatic damage. When our body is unable to fight back the stress, the functions of the pancreas start getting affected. This results in abnormal secretion of digestive enzymes and symptoms of diabetes. Dietary supplementation of pomegranate offers a defense back-up to our intrinsic machinery.



Figures: Pomegranate – Nature's Power Fruit

Pomegranate is rich in anti-oxidants, compounds that soak up the extra ROS generated during the inflammatory process. This boosts our metabolism and helps prevent pancreatic disorders.

Diseases like chronic pancreatitis don't happen overnight. Recurrent stressors which are part of our lifestyle keep inflicting regular damage and eventually result in disease symptoms of pancreatitis and other pancreatic diseases. By the time an individual starts feeling the effects and displaying symptoms of pancreatic damage, the disease is already progressed and the damage done. A report published in 1997 stated that there were up to 200 cases per 100000 population of chronic pancreatitis in South India alone and the epidemiological trend had shown an upward

slope. The incidence of diabetes needs no mention. Our study offers a simple and scientifically tested remedy to this problem. The incorporation of pomegranate supplement in our diet will help prevent such grave consequences.

Pancreatitis and other diseases stemming from pancreatic break-down are poorly understood. The clinical management of such diseases remain evasive and difficult. There is imminent need to further understand the pathology and epidemiology of such diseases. The study that I am pursuing deals with understanding processes that involve and affect our life and well-being. Even the first antibiotic, Penicillin, was a product inspired from natural sources. Grave diseases like Cancer start off as a localized inflammatory process. The simple practice of incorporating pomegranate in our routine diet will help our body fight inflammation and oxidative stress, reducing our disease burden.