Gut Microbial Markers and Autonomic Imbalance in Diabetic Patients

Alina Claudia*

Department of Pathophysiology, University of Medicine and Pharmacy, Iasi, Romania

DESCRIPTION

Redox imbalance stress in diabetes mellitus is a condition where the balance between oxidants and antioxidants is disturbed due to the activation of the polyol pathway, which consumes glucose and produces sorbitol, fructose and NADH. The polyol pathway is an alternate pathway of glucose metabolism that becomes active in patients with diabetes, especially when there is high blood glucose level. The polyol pathway can lead to oxidative damage to DNA, lipids, and proteins and consequently to oxidative stress, which can worsen diabetes and its complications. The precise mechanism through which oxidative stress regulates diabetes progression is still unclear, but some possible factors include glycation, inflammation, mitochondrial dysfunction and impaired insulin signaling. Some potential therapeutic strategies against diabetes involve restoring the redox balance by using antioxidants, inhibitors of the polyol pathway or nicotinamide riboside.

Gut microbial markers are specific bacteria or bacterial groups that are associated with diabetes onset, progression or complications. Gut microbial markers can reflect the imbalance between beneficial and harmful bacteria in the gut microbiota, which can affect the host's immune system, metabolism and inflammation. Some examples of gut microbial markers for type 1 diabetes are S24-7, Prevotella, Lachnospiraceae, Ruminococcus and Oscillospira. Some examples of gut microbial markers for type 2 diabetes are *Akkermansia muciniphila*, *Faecalibacterium prausnitzii*, *Bacteroides fragilis* and *Roseburia intestinalis*. Gut microbial markers can be used for diagnosis, prevention and treatment of diabetes by modulating the gut microbiota with probiotics, prebiotics, fecal microbiota transplantation or dietary interventions.

Cardiac autonomic imbalance in diabetic patients is a condition where the Autonomic Nervous System (ANS), which regulates the heart rate and blood pressure, is impaired due to diabetes. It can lead to cardiovascular complications such as abnormal heart rhythms, postural hypotension, silent myocardial ischemia and sudden cardiac death. It can be diagnosed by measuring the Heart Rate Variability (HRV), which is the variation in the time interval between heartbeats. A low HRV indicates a reduced ANS function. It can be influenced by factors such as age, sex, duration of diabetes, glycemic control, obesity, inflammation and genetic mutations. It can be treated by improving glycemic control, lifestyle modifications, pharmacological interventions and device therapies.

Antidiuretic Hormone (ADH), also called vasopressin or arginine vasopressin, is a hormone that helps the body regulates water balance by controlling the amount of water the kidneys reabsorb. It is produced by the hypothalamus and stored and released by the pituitary gland. It acts on the kidney tubules to increase water reabsorption and decrease urine volume. It can be affected by diabetes insipidus, a condition that causes excessive thirst and urination due to a lack of ADH or a reduced response to ADH by the kidneys. Its levels can also be affected by Syndrome of Inappropriate Antidiuretic Hormone secretion (SIADH), a condition that causes low blood sodium levels due to excess ADH production or release. SIADH can be caused by various factors such as brain injury, tumors, infections, medications or lung diseases. The levels can be measured by a blood test or a urine test. The test results can help diagnose diabetes insipidus, SIADH or other disorders of water balance.

CONCLUSION

Imbalance in diabetes insipidus is a condition where the body fluids get out of balance due to a problem with the hormone that regulates water balance, called Antidiuretic Hormone (ADH) or vasopressin. It causes the kidneys to produce large amounts of diluted urine, which leads to frequent urination and excessive thirst. It can result in dehydration, electrolyte imbalance, low blood pressure and fatigue. It can be caused by damage to the pituitary gland or hypothalamus, kidney disease, genetic mutations, certain medications or pregnancy. Imbalance in diabetes insipidus can be treated by replacing fluids, taking medications that mimic ADH or reduce urine output, and addressing the underlying cause if possible.

Correspondence to: Alina Claudia, Department of Pathophysiology, University of Medicine and Pharmacy, Iasi, Romania, E-mail: lina@clu.com