SPANDIDOS PUBLICATIONS WORLD ACADEMY OF SCIENCES JOURNAL 7: 125, 2025

Oxidative stress at the crossroads of diabetic neuropathy: Mechanisms and implications of antidiabetics (Review)

Abstract

Diabetic neuropathy (DNP) is among the most common complications of diabetes, affecting the majority of individuals with long-standing diabetes. This painful microvascular condition is associated with a high risk of morbidity. While multiple factors are considered to contribute to the development of DNP, its exact cause remains unclear, although several theories have been proposed. Despite ample research aimed at detecting and attenuating the progression of DNP, effective treatment options remain limited. The present review delves into the connection between oxidative stress and neuropathy in patients with diabetes, with particular focus on the mechanisms through which antidiabetic medications may influence oxidative stress to help attenuate the advancement of DNP. For the purposes of the review, a search for relevant articles was performed using online sources, including the PubMed and Google Scholar databases, using key words, such as antidiabetics, antioxidant effects, diabetes, diabetic neuropathy and oxidative stress. It is currently considered that hyperglycemia and complex metabolic imbalances, particularly oxidative stress, play central roles in the development of DNP. Some antidiabetic drugs have antioxidant properties, either by boosting the body's own antioxidant enzymes or by reducing the production of harmful reactive oxidants. These antioxidant effects are linked to a lower risk of developing diabetic complications, including DNP. While certain antidiabetic medications may help prevent DNP from becoming more severe, others may have no effect or may even exacerbate the condition.