



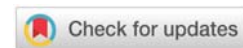
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## Mini Review

# Cardiac Effects of Parkinson's Disease

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## Abstract

Parkinson's disease, which has symptoms and signs such as tremor, bradykinesia, rigidity and postural instability, is the most common neurodegenerative disease after Alzheimer's disease. In Parkinson's disease, pathological mechanisms such as abnormal accumulation of protein aggregates, disruption of protein clearance pathways, oxidative stress, neuroinflammation, mitochondrial damage and genetic mutations lead to the formation of the clinic. Coronary artery disease, heart failure, cardiac autonomic dysfunction, heart failure, sudden death and hypertension can be seen in Parkinson's disease. Parkinson's disease leads to an increased risk of morbidity and mortality associated with these diseases. Dopaminergic drugs, non-dopaminergic drugs, growth factor support, stem cell therapy, gene therapy, exercise, diet and surgical treatment play an important role in the treatment of Parkinson's disease. This treatment helps to reduce cardiac effects.

## Introduction

Parkinson's disease, which is characterized by tremor, bradykinesia, rigidity and postural instability, is the most common neurodegenerative disease after Alzheimer's disease [1]. As the age increases, the incidence of this disease increases. It is seen at a rate of 0.3% above the age of 40, while it is seen in 3% above the age of 80. In this disease, a degeneration that reduces dopamine release from the cells in the substantia nigra in the brainstem is responsible [1,2]. In addition, diffuse accumulation of alpha synuclein, an intracellular protein, is responsible for neuropathogenesis in this disease [2]. Cardiac diseases are common during the course of Parkinson's disease. Cardiovascular diseases such as coronary artery disease, heart failure, cardiac autonomic dysfunction, heart failure, sudden death and hypertension can be seen in Parkinson's disease. The accompanying of these diseases to Parkinson's disease leads to an increase in the risk of morbidity and mortality. That's why we wrote a review on the cardiac effects of Parkinson's disease.

## Risk factors and mechanisms

Both cardiovascular disease and Parkinson's disease are less common in conditions such as moderate coffee consumption, increased physical activity and female gender. While there is a clear association between smoking, high total cholesterol, and high LDL cholesterol and cardiovascular disease, there is a weak relationship between these risk factors and Parkinson's

disease. There is a strong relationship between diabetes, advanced age and male gender and both cardiovascular disease and Parkinson's disease [3]. Genetic, environmental and biological factors affect glucose metabolism, cellular stress, lipid metabolism and inflammation. As a result, hyperglycemia, insulin resistance, advanced glucose end degradation products, reactive oxygen radicals, sphingolipid accumulation, oxidized LDL cholesterol accumulation and C-reactive protein increase are observed [4]. Depending on these mechanisms, the development of Parkinson's disease, cardiovascular diseases, diabetes and hypertension is triggered. Folded accumulation of protein aggregates, disruption of protein clearance pathways, mitochondrial damage, oxidative stress, excitotoxicity, neuroinflammation and mutations are important pathological mechanisms that contribute to the shaping of the clinic in Parkinson's disease [5].

## Cardiac diagnostic evaluation

Examinations and methods are used to diagnose cardiovascular diseases in Parkinson's disease. Anamnesis, physical examination, blood pressure measurement, electrocardiography, blood tests, stress test, X-ray, echocardiography, tilt test, event recorder, cardiac magnetic resonance imaging, blood pressure holter, rhythm holter, myocardial perfusion scintigraphy and exercise test are important in this respect.



## Evaluation of cardiac effects

Even in the early stages of Parkinson's disease, blood pressure changes can occur due to autonomic nervous system dysfunction. This autonomic nervous system dysfunction can lead to orthostatic hypotension, postprandial hypotension, nocturnal hypertension, and supine hypertension. These blood pressure changes can be seen in the premotor stage of Parkinson's disease. Hypertension in Parkinson's disease is associated with rapid dopaminergic neurodegeneration and motor symptoms. Chronotropic insufficiency can be seen as an early sign of autonomic dysfunction in Parkinson's disease [1-4].

Cardiomyopathies are extremely rare in Parkinson's disease. Increased left ventricular mass, increased left ventricular pressure, increased left atrial volume, concentric remodeling, and diastolic dysfunction can be seen in these patients. In advanced stage, heart failure may develop [2,4]. Coronary artery disease is also common in these patients, as Parkinson's disease is associated with atherosclerotic risk factors such as hypertension and diabetes. The accompanying vascular disease leads to an increase in mortality in Parkinson's disease. Parkinson's disease also rarely has sudden cardiac death. The causes of sudden cardiac death include conduction defect, hypotonia, ventricular arrhythmias (due to the long QT due to the drugs used) and cardiomyopathies. Right bundle branch block or anterior hemiblock can be seen in these patients due to a defect in the PRKAG2 gene. Tremor artifacts can be confused with supraventricular or ventricular arrhythmias [2-6].

## Treatment of parkinson's disease

Treatment of Parkinson's disease helps to eliminate cardiac effects. In the treatment of Parkinson's disease, dopaminergic drugs (Levodopa, Monoamine oxidase B inhibitors, catechol-O-methyl transferase inhibitors), non-dopaminergic drugs (anticholinergic drugs, norepinephrine, serotonergic receptor and muscarinic receptor effective drugs, antiviral drugs, antiviral drugs), growth factors supplementation, stem cell therapy, gene therapy, diet, rehabilitation treatments and surgical treatment (lesion surgery, deep brain stimulation) are used [7-15].

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