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The Pathophysiology and Nursing Care for Parkinson's Disease

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Introduction

According to the Parkinson's Disease (PD) Foundation, PD is a progressive neurodegenerative disease that affects dopamine-producing neurons in an area of the brain called the substantia nigra (“Understanding Parkinson’s,” 2019). This impairment of neurons causes individuals with PD to have low levos or completely lack the neurotransmitter dopamine in the brain (“Understanding Parkinson’s,” 2019).

Dopamine plays a critical role in regulating various movements and therefore lack of dopamine will cause diminished muscle control and difficulty managing everyday tasks (“Understanding Parkinson’s,” 2019). Bradykinesia (slowness of movement), or resting tremor (“Understanding Parkinson’s,” 2019), is a few of the gene mutations which research has identified to be associated with PD include Alpha-synuclein gene (SNCA), Glucocerebrosidase gene (GBA), and Leucine-rich repeat kinase 2 (LRRK2) gene (DeMaagd & Philip, 2015).

Environmental risk factors which research has identified to be associated with the development and progression of PD include: Deleterious environmental toxins (or pesticides), head trauma, elevated body mass index (BMI), oxidative stress and the formation of free radicals from exposure to numerous carcinogens (DeMaagd & Philip, 2015).

The hallmark pathophysiological processes for PD are loss of dopaminergic neurons of the substantia nigra in the midbrain which are critical for smooth and fluid movements and the formation or loss of Lewy bodies which contribute to the cognitive impairments occasionally seen as the disease progresses or later stages (“Gopalakrishna & Alexander, 2015). Loss of dopaminergic neurons due to Nigrostriatal dopaminergic degeneration is the basal ganglia leads to a decrease in excitation and inhibition pathways in the brain resulting in the overall decrease in motor function for PD patients (Gopalakrishna & Alexander, 2015). The progression of the disease also supports the hypothesis of the involvement of the glutamatergic, cholinergic, and adrenocortical systems (DeMaagd & Philip, 2015).

There is still much to be discovered regarding the presence of Lewy bodies in PD patients. Some research shows that the amount of Lewy bodies may be associated with better quality of life due to the progression of the disease (“Understanding Parkinson’s,” 2019). Parkinson’s disease (PD) is the gold standard diagnosis method (“Understanding Parkinson’s,” 2019). Therefore, a clinical diagnosis requires a full patient history, assessment of clinical signs and symptoms, and evaluation of the signs and symptoms of PD to manage symptoms so that patients with the disease are living longer with increased quality of life (“Understanding Parkinson’s,” 2019). By having knowledge about the possible genetic and environmental factors associated with PD and how they contribute to the development as well as the progression of PD (“Gopalakrishna & Alexander, 2015) research shows that the amount of levodopa response (Dopamine) in the substantia nigra may contribute to the cognitive impairments (“Gopalakrishna & Alexander, 2015). Lewy bodies which contribute to the cognitive impairments occasionally seen as the disease progresses or later stages (“Gopalakrishna & Alexander, 2015). Thus, research has shown that even larger amounts of dopamine increases may see cognitive improvements in patients who have previously showed cognitive impairment in lower stages of the disease, and improve muscle strength and walking speed for those struggling with the typical motor symptoms of PD (“DeMaagd & Philip, 2015).”

Nursing Implications

APRNs must focus their care on maintaining/increasing the patient’s quality of life despite the disease’s current status. The APRNs must be knowledgeable about motor and nonmotor symptoms of the disease (“Biercewicz, Enns, & Bieve, 2016).”

• Support the patient with Physical Therapy or Occupational Therapy as a researcher has found that their ability to perform daily tasks lowers the patient’s risk of falls (“Biercewicz, Enns, & Bieve, 2016).”

• Support the patient’s lifestyle with a healthy, nutritious diet which can help reduce the patient’s risk of falls (“Biercewicz, Enns, & Bieve, 2016).”

• Educate the patient about the effects of medication and the importance of adherence and/or nutrition to help combat these symptoms/side effects (Capriotti & Torek, 2016).

• Utilize the Parkinson’s Nursing Olympiad: Assessment or The Mini-Mental Status Examination to evaluate cognitive impairment (“Biercewicz, Enns, & Bieve, 2016).”

• Encourage the patient to discuss their experiences of living with PD with a psychiatric team to improve their quality of life (“Biercewicz, Enns, & Bieve, 2016).”

• If symptoms are not being managed medically well, the APRN could educate the patient about the option of the surgical intervention called subthalamic nucleus stimulation (“Biercewicz, Enns, & Bieve, 2016).”

Signs and Symptoms

The signs and symptoms of PD can vary based on the individual and the progression of the disease and can be classified as motor symptoms or nonmotor symptoms. The classic symptoms are listed below.

Motor Signs and Symptoms:
• Bradynkinesia (slowness of movement)
• Rigidity
• Stiffness at rest
• Postural instability
• Shuffling gait
• Stuporose posturing
• Fine tremor (uncontrollable, involuntary muscle movement)
• Micrographia (small handwriting)

Nonmotor Signs and Symptoms:
• Staring appearance/Masked facial expression
• Flat affect
• Depression/mood alteration
• Sleep disturbance
• Autonomic dysfunction including: inappropriate dia- phoresis, orthostatic hypotension, gut dysfunction, nausea, constipation, and autonomic nervous system involvement
• Cognitive impairment
• Depressive disorders
• Unexplained sensory disturbances (pain, impaired smell, and vision) (“Understanding Parkinson’s,” 2019).

Significance of Pathophysiology


References


Signs and Symptoms:
- While there have not been any cure scenarios established, a recent study research suggests that genetic and environmental factors contribute to the development as well as the progression of PD (Gopalakrishna & Alexander, 2015).

Case Process

This is a 62 year-old Caucasian male patient who was referred for a neurological exam to determine if he had any signs or symptoms of Parkinson’s disease. The patient had been exhibiting signs of slowness for the past several months. He had also been experiencing tremors and occasional stiffening of his hands.

History: Elevated Cholesterol levels, Osteoporosis

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