



# Parkinson's Disease in Canadians

KIN 260: Foundations of Canadian Sport  
and Physical Activity

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# What is Parkinson's Disease?



(Parkinson's<sup>UK</sup>, 2017)

- Neurodegenerative disease leading to shaking and stiffness which leads to difficulty with walking, balance and coordination. The cells that normally produce dopamine die.
- Both men and women can get it.
  - 50% more in men than women
- Diagnosis takes time as there are no x-rays or tests to confirm it.
  - Neurologist will check medical history and do a physical examination and certain tests to rule out other conditions.
- Currently no cure.

(National Institute on Aging, 2017 and Parkinson Canada, n.d.)

# Symptoms of Parkinson's

- **Motor symptoms**

- Tremor in hands, arms, legs, jaw or head
- Stiffness of the limbs and trunk
- Slowness of movement
- Impaired balance and coordination

- **Nonmotor symptoms**

- Depression
- Emotional changes
- Difficulty swallowing, chewing and speaking
- Urinary problems
- Constipation
- Skin problems
- Sleep disruptions



(National Institute on Aging, 2017)

# Stages of Parkinson's Disease

**Stage One**, the mildest form of Parkinson's, shows some symptoms but they do not affect or interfere with daily life. Tremors and other difficulties in movement that are only on one side of the body are a distinct symptom of stage one Parkinson's. Medications can be used to minimize or reduce symptoms.

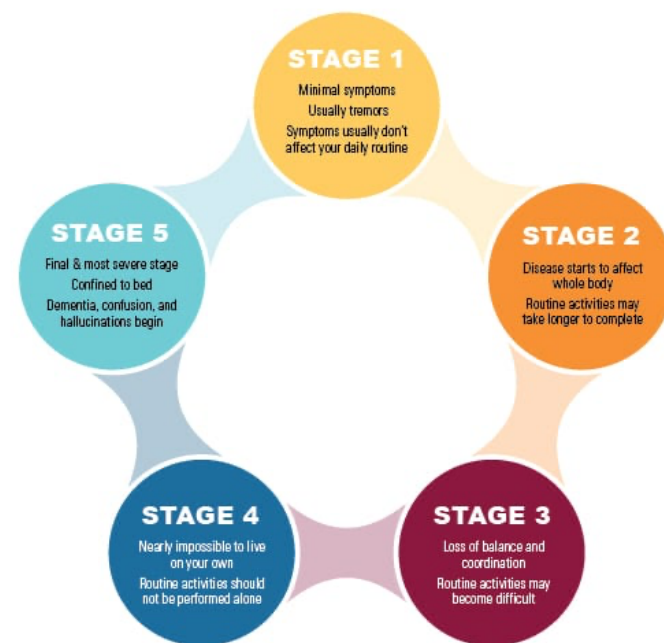
**Stage Two**, the moderate form of Parkinson's, shows more noticeable symptoms such as stiffness, tremors, trembling and changes in facial expressions. Balance is not impaired but walking difficulty will increase. Progression from stage one can be months or years.

**Stage Three**, the middle form of Parkinson's, shows many symptoms from stage two as well as decreased reflexes and loss of balance. Falls become more common as movements are slower and daily tasks are affected but can still be completed. Medications and occupational therapy is used to help decrease symptoms.

**Stage Four**, shows the individual losing independence as movement is very challenging and reaction times are slow. Daily tasks are almost impossible, and a walker is needed for assistance.

**Stage Five**, the most advanced stage of Parkinson's, involves not being able to stand or walk without falling. Hallucinations, delusions and confusion are also symptoms of this stage.

## STAGES OF PARKINSON'S DISEASE



([Aging.com](https://www.aging.com), n.d. and Healthline, 2020)

# Causes of Parkinson's Disease

## 1. Impairment and/or death to neurons in the brain area that controls movement

- These neurons normally will produce dopamine, but when impaired they produce less dopamine
- Less dopamine causes motor symptoms observed in Parkinson's
- Scientists are still unsure what causes the cells to die

## 2. Loss of nerve endings that produce norepinephrine

- Norepinephrine is a main messenger in the sympathetic nervous system
- Loss of norepinephrine can help explain the non-motor symptoms of Parkinson's such as fatigue, irregular blood pressure, decreased food through the digestive tract and sudden drop in blood pressure when standing up

## 3. Brain cells containing Lewy bodies

- Unusual clumps of protein alpha-synuclein
- Scientists are still trying to better understand the normal and abnormal functions of alpha-synuclein
- Associated with non-motor symptoms of Parkinson's



Contribution of both genetic and environmental factors

(Kalia and Lang, 2015 and National Institute on Aging, 2017)

# Treatments of Parkinson's Disease



No medications proven to stop the progression of Parkinson's; however, there are medicines, surgical treatments and therapies that can relieve some symptoms

## Physical activity and physical therapy

- Improve motor and non-motor symptoms
- Improves how they feel and their ability to perform daily activities of living
- Most effective if started early
- Slows progression of Parkinson's
- Physical therapy would include gait re-education, improvement of balance and flexibility, enhancement of aerobic capacity and strength, and improvement in movement initiation

( Aarsland *et al.*, 2017 and National Institute on Aging, 2017)

# Treatments of Parkinson's Disease



## Levodopa and Carbidopa

- Important to talk to doctor about when to start taking medications
  - Requires close monitoring and evaluation
- Focused on motor symptoms
- Help do daily activities, but also some side effects
  - Nausea, vomiting, dizziness, sleepiness and visual hallucinations
- Levodopa is synthesized into dopamine in the brain
  - May "wear off" after several years of use
- Carbidopa is a Levodopa enhancer (lower dose of Levodopa is need)
  - Also reduces some side effects of Levodopa (Ex. Nausea, vomiting, low blood pressure and restlessness)

(Grimes *et al.*, 2019 , National Institute on Aging, 2017, Parkinson Canada, n.d. )



# Treatments of Parkinson's Disease



[\(University Hospitals, 2019\)](#)

## Deep Brain Stimulation

- Manage motor symptoms
- For those who do not respond well to medications
- Surgical procedure involving implanting electrodes into part of the brain which are connected to a small electrical device implanted in the chest
  - Device and electrodes painlessly stimulate brain which should help stop motor symptoms (Ex. tremor, slowness of movement and rigidity)
- Typically, after 10-13 years of being diagnosed an individual with Parkinson's will undergo surgical treatment

(Kalia and Lang, 2015 and National Institute on Aging, 2017)





## Risk Factors for Parkinson's Disease

- **Age:** Parkinson's is rare in young adults and is typically begins in middle or late-aged individuals. Age 60 or older is the typically age for developing Parkinson's disease.
- **Heredity:** Slightly increased chance of getting Parkinson's if you have a close family member with it. Chances increase if many relatives within the family have Parkinson's disease.
- **Sex:** Men are more likely than women to develop Parkinson's disease. Male-to-female ratio of approximately 3:2.
- **Exposure to toxins:** Increased risk if exposed to herbicides and pesticides continually.
- **Other environmental factors:** Prior head injury, rural living, beta-blocker use, agricultural occupation, and well-water drinking.

(Kalia and Lang, 2015 and Mayo Clinic, n.d.)

# Prevalence and Incidence of Parkinson's Disease in Canada

- Latest estimates available for Canada are from 2013-2014 and are for Parkinsonism
  - Parkinsonism: includes Parkinson's disease, secondary parkinsonism and atypical parkinsonism
- 84,000 Canadians 40+ years of age were diagnosed with Parkinsonism
  - Prevalence=0.4%
  - Prevalence of Parkinsonism in 85+ years of age is 169x higher than in those aged 40-44 years of age
- 10,000 Canadians newly diagnosed
  - Incidence= 55.1% per 100,000 population
- Estimated that between 2011 and 2031, the number of Canadians living with Parkinsonism will double and the incidence will increase by 50%

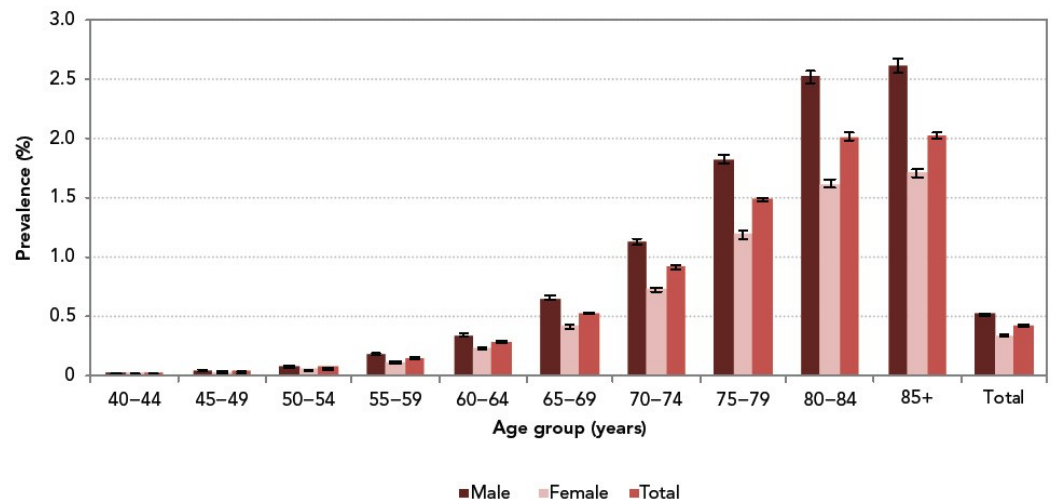


Figure 1. Prevalence (%) of diagnosed parkinsonism including Parkinson's disease, by sex and age group, Canada, 2013-2014.

(Government of Canada, 2019)



## Closer Look at Physical Activity and Parkinson's Disease in Canadians

- Get Active and Stay Active!
  - Physical activity is a life-long commitment and should be initiated early.
  - Those who have Parkinson's and exercise are better off than those who are not active.
  - Important to engage in variety of activities to help reduce boredom
    - Aerobic
    - Flexibility
    - Strengthening
    - Balancing
- Important to consult a doctor, especially if 60+ years of age
- Work with a physiotherapist to design an individual exercise program and to ensure activities are performed properly and safely
- Choose activities that are FUN to ensure commitment

[\(Canadian Physiotherapy Association, 2012\)](#)



# Activities for Individuals with Parkinson's Disease

## **Flexibility Activities**

involve improving mobility, increasing range of motion and reducing stiffness. Everyday activities will be easier as improving range of motion affects posture and walking ability in a positive way. Examples of flexibility activities include, Tai Chi and stretching.

## **Strengthening Activities**

involve improving muscle strength, walking speed, posture and overall fitness. Everyday activities such as getting up from a chair will be easier with improvements in strength. Examples of strengthening activities include, yard work, gardening and weights/resistance training.

## **Balance Activities**

involve improving posture and stability. Fear of falling will be reduced and ease of everyday tasks will be improved with an increase in balance. Examples of balance activities include, yoga, hiking and Wii.

**Aerobic Activities** involve the body's large muscles moving in rhythm for a long period of time. Physical fitness, including strength and endurance will be increased through aerobic activities. Aerobic activities for individuals with Parkinson's will help with slowness, stiffness, mood and quality of life. Examples of aerobic activities include, brisk walking, swimming, cycling, dancing, skating, hiking, and water aerobics.



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