

# Effect of Physiotherapy Interventions and Diet Management in Parkinsonism: Review Paper

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**Abstract:** *The paper is focused on importance of physiotherapy intervention and dietary management in Parkinsonism disease. Physiotherapy is considered to be useful adjunct to the medical treatment of this disorder. Both gait training and exercise therapy have been used by therapist to treat these patients. This has been also proved from various studies that exercises also benefit patient by decreasing his stress levels. Physiotherapy is widely used in the association with the pharmacological treatment in the management of Parkinson's disease, particularly in the advance stages of the disease. There is no specific diet recommended for people with Parkinson disease. Balanced diet is beneficial to the patient. It is important to be sure that the person is getting an adequate number of calories and nutrients to maintain strength, bone structure, and muscle mass. Protein intake should be adequate but a gap of 30 minutes after and before intake of Levodopa is recommended.*

**Keywords:** Physical exercises, food, neurological problems, PD, diet and physiotherapy.

## 1. Introduction

Parkinson's disease (PD also known as idiopathic or primary parkinsonism, hypokinetic rigid syndrome/HRS, or paralysis agitans) is a degenerative disorder of the central nervous system. The motor symptoms of Parkinson's disease result from the death of dopamine-generating cells in the substantia nigra, a region of the midbrain; the cause of this cell death is unknown. Early in the course of the disease, the most obvious symptoms are movement-related; these include shaking, rigidity, slowness of movement and difficulty with walking and gait. Later, thinking and behavioral problems may arise, with dementia commonly occurring in the advanced stages of the disease, whereas depression is the most common psychiatric symptom. Other symptoms include sensory, sleep and emotional problems. Parkinson's disease is more common in older people, with most cases occurring after the age of 50 (file://localhost/C:/Users/compaq/Desktop/rajesh/Parkinson's%20disease%20%20Wikipedia,%20the%20free%20encyclopedia.mht, retrieved on 2/4/2014).

Parkinson's disease affects movement, producing motor symptoms. Non-motor symptoms, which include autonomic dysfunction, neuropsychiatric problems (mood, cognition, behavior or thought alterations), and sensory and sleep difficulties, are also common. Some of these non-motor symptoms are often present at the time of diagnosis and can precede motor symptoms. Four motor symptoms are considered cardinal in PD: tremor, rigidity, slowness of movement, and postural instability (Jankovic, 2008). There is no cure for Parkinson's disease, but medications, surgery and multidisciplinary management can provide relief from the symptoms. The main families of drugs useful for treating motor symptoms are levodopa (usually combined with a dopa decarboxylase inhibitor or COMT inhibitor), dopamine agonists and MAO-B inhibitors (Collaborating Centre for Chronic Conditions, 2006).

## 2. What role does exercise play in the management of Parkinson's disease:

Parkinson disease (PD) is a disabling neurodegenerative disease for which current treatments are suboptimal. As exercise is generally safe, inexpensive, and associated with secondary benefits, interest in exercise as a treatment for the motor symptoms of the disease is increasing (Rosenthal and Dorsey, 2013). Exercise is an important part of healthy living for everyone. However, for people with PD exercise is not only healthy, but a vital component to maintaining balance, mobility and daily living activities (file://localhost/C:/Users/compaq/Documents/rajesh/National%20Parkinson%20Foundation%20-%20Neuroprotective%20Benefits%20of%20Exercise.mht). Doing exercise is associated with a better sense of well being, even across stages and severity of the disease. In PD, individuals at an early and moderate stage of the disease have greater reduction in physical activity level than asymptomatic individuals of the same age (Goulart et al. 2004). Furthermore, inactivity is considered an important factor in accelerating the degenerative process of PD (Tillerson et al. 2002). Otherwise, there is consensus in the literature that regular exercise practice improves physical and functional performance in different populations (Nelson et al. 2007, Dalgas et al. 2009). Research has shown that regular exercise benefits people with Parkinson's disease. Exercise basically done to reduces stiffness and for improvement of mobility, posture, balance and gait (http://pdcenter.neurology.ucsf.edu/patients-guide/exercise-and-physical-therapy). Exercise program developed by the United Parkinson Foundation and a program of upper body karate training designed for parkinsonism patient showed improvements in gait, tremor, grip strength and motor coordination on tasks requiring fine control. The findings suggest that exercise is a useful adjunct to pharmacologic therapy (Palmer et al.,1986). Exercise has been proven to help alleviate the symptoms of Parkinson's disease (PD). It is one the most important keys to living well with PD.

Exercise can improve strength, balance, stability and peace of mind. At the time the physician prescribes medications, exercise should also be prescribed. Exercising changed neither the amount of dopamine nor the amount of neurons in the animals' brains. But in the ones that had exercised, the brain cells were using dopamine more efficiently. They also found that exercise improves that efficiency by modifying the areas of the brain where dopamine signals are received — the substantia nigra and basal ganglia (<http://www.parkinson.org/Parkinson-s-Disease/Treatment/Exercise/Neuroprotective-Benefits-of-Exercise>, retrieved on 2/6/14). The exercises mainly work on posture, balance and movement, as used in activities such as turning in bed, looking around and walking. A person with Parkinson's disease should enter into an exercise plan with the help of a physiotherapist. By evaluating patient's particular needs, these professionals can craft a plan that is both safe and effective. The exercise program they develop might focus on: Joint or muscle pain that interferes with daily life, Problems with mobility or walking, Difficulties with balance and Issues involving daily chores such as eating, dressing, bathing, and handwriting. A physiotherapist also can teach caregiver how patient's body functions and give him tips about how to assist him/her with in-home exercises and daily tasks (Thompson, 2014). Commonly done exercises in parkinsonism are stretching exercises, Strength training, Aerobic conditioning, Aquatic exercise and Range-of-motion therapy.

### 3. Parkinson disease and diet therapy

It is difficult for a person to feel well and maintain energy when he or she is not eating properly. Eating properly involves eating regularly (no meal skipping), eating a variety of foods from all of the food groups (grains, vegetables, fruit, milk/ dairy, meat/beans) and eating prudently to maintain a healthy weight (Traviss, 2014). While there is no special diet for people with Parkinson's disease, eating a well-balanced, nutritious diet is extremely beneficial. With the proper diet, our bodies work more efficiently, we have more energy, and Parkinson's disease medications will work properly (<http://www.webmd.com/parkinsons-disease/guide/eating-right> retrieved on 5/4/14). Constipation, urinary tract infections (UTIs), thinning bones, and unexplained weight loss are all common in persons with Parkinson's Disease (PD). Preventing or managing these conditions can be accomplished through proper hydration and nutritional intake. Key dietary factors discussed below include reducing toxic load, reducing homocysteine with folic acid, vitamins B12 and B6, folic acid and tri-methylglycine (TMG) and increasing Omega 3 fats, Vitamin D and Magnesium and protein intake and drug interactions.

#### a) Reducing toxic load

While the cause of Parkinson's is not known, environmental toxins such as pesticides and herbicides are implicated. Researchers have found levels of these chemicals to be higher in the brains of Parkinson's sufferers and incidence of Parkinson's is higher in areas with greater use of these chemicals. It makes sense to avoid any environmental toxins that one can. Also, considering intake of dietary toxins such as alcohol and caffeine – avoiding or reducing these may reduce the load on body's detoxification pathways

(<http://www.foodforthebrain.org/nutrition-solutions/parkinsons-disease/about-parkinsons-disease.aspx>, retrieved on 22/4/14).

#### b) Reducing homocysteine with folic acid

Low folate intake increases plasma homocysteine (Selhub et al.,1993), which damages the vascular endothelium and increases the risk of cardiovascular diseases (Homocysteine Studies Collaboration,2002). Homocysteine is also neurotoxic, and hyperhomocysteinemia has been associated prospectively with higher risk of Alzheimer's disease in the Framingham Study (Seshadri et al.,2002). Further, a high homocysteine concentration as well as folate deficiency may decrease glutathione peroxidase activity and reduce tissue concentrations of antioxidant vitamins (Upchurch et al.,1997), making neurons more vulnerable to oxidative attacks. Homocysteine may also induce neuron apoptosis by damaging neuron DNA and subsequently depleting neural energy reserves to repair the damages (Kruman et al., 2002). Individuals with Parkinson's disease have had higher plasma homocysteine concentrations than those without the disease (Miller et al.,2003). This increase may reflect dietary changes after Parkinson's disease diagnosis or may be related to the long-term use of levodopa in Parkinson's disease patients, which may deplete the intracellular methyl group, increase homocysteine concentrations, and promote its extracellular export (Liu.,2000). However, the higher concentration of plasma homocysteine is also consistent with the possibility that homocysteine itself is neurotoxic to dopaminergic neurons and thus increases the risk of Parkinson's disease (Chen et al.,2014). Further research on this aspect suggests that dietary intake of folate, vitamin B<sub>6</sub>, or vitamin B<sub>12</sub> is not related to risk of Parkinson's disease. If high intake of folate reduces the risk of Parkinson's disease, its beneficial effect is most likely restricted to individuals who are exposed to neurotoxins or who are genetically at risk of hyperhomocysteinemia (Chen et al.,2014).

#### c) Vitamins B12 and B6

A higher dietary intake of vitamin B6 may decrease the risk of Parkinson's disease ([http://www.pdf.org/en/science\\_news/release/pr\\_1216656975](http://www.pdf.org/en/science_news/release/pr_1216656975), retrieved on 1/5/2014).

Increasing B12, B6 and folic acid will often result in a decrease in homocysteine levels, though it is not yet known whether this will improve memory (<http://www.parkinson.org/Parkinson-s-Disease/Treatment/Complementary-Treatment/Vitamin-B12>, retrieved on 30/4/2014). It is also reviewed from data that people suffering from this disease lack dopamine, a brain chemical that transmits impulses from nerve to nerve. They are also often deficient in vitamin B6. Interestingly, supplements of the vitamin work to increase the production of dopamine (<http://www.wholehealthchicago.com/757/vitamin-b6>, retrieved on 2/5/14). Rich sources of Vitamin B6 and B12 should be included in the diet of patient as they act as antioxidant in the body. It was found that Vitamin B6 prevented the absorption of the Levodopa, so patients were advised not to eat food rich in B6. But now this medication comes in combination with carbidopa or benserazide. These "protect" the Levodopa so that Vitamin B6 in reasonable amount is no longer thought to be a problem (Holden, 2005).

**d) Folic acid and tri-methyl-glycine (TMG)**

Both folic acid and tri methyl glyceric acid have been used for nearly two decades to lower homocysteine. These two pathways are independent. Some people are better by using tri methyl glyceric acid to lower homocysteine and others are better at utilizing folic acid. That is why it is better to use both. Combination approach in conjunction with Vitamin B6 and B12 can normalize homocysteine in most cases (Audhya, date not published, retrieved on 2/5/14).

**e) Omega 3 fats**

Omega-3 fatty acids (ALA, EPA and DHA) protect the brain against PD, according to a study by Universite Laval researchers. This study supervised by Frederic Calon and Francesca Cicchatti, was the first attempt demonstrate the protective effect of a diet rich in omega-3 fatty acid against Parkinson's

([www.sciencedaily.com/releases/2007/11/071126110453.html](http://www.sciencedaily.com/releases/2007/11/071126110453.html) retrieved on 1/2/2014). A number of animal studies have shown that DHA has preventive and therapeutic effect against PD (Stahl et al., 2008). Fish is good source of Omega-3 fatty acids in non vegetarians but for vegetarians flax seeds or chia seeds are good source ([https://www.drfuhrman.com/library/omega3\\_supplements.aspx](https://www.drfuhrman.com/library/omega3_supplements.aspx), retrieved on 28/4/14).

**f) Vitamin D and Magnesium**

Vitamin D supplements have been shown to have a positive effect on muscle strength and balance in the Parkinsonism patients (<http://www.dietdoctor.com/vitamin-d-can-help-people-with-parkinsons-disease>, retrieved on 1/5/2014). Persons with PD are also at risk for thinning bones and need to consider adequate nutritional intake to promote strengthening of bones and maintenance of bone density. This intake should include foods containing micronutrients such as calcium, magnesium, vitamin D, and vitamin K (APDA,2014). Magnesium is required to transform Vitamin D from its storage form to its active form. Magnesium is utilized by the body for all sorts of detoxification pathways and is necessary for the neutralization of toxins, overly acidic conditions that arise in the body, and for protection from heavy metals. It plays a vital role in protecting patients from the toxicity of man-made chemicals all around us. Glutathione, an antioxidant normally produced by the body and a detoxifier of mercury, lead and arsenic among others, requires magnesium for its synthesis (<http://www.westonaprice.org/health-topics/abcs-of-nutrition/magnificent-magnesium/>, retrieved on 29/5/2014).

**g) Protein intake and drug interactions**

Levodopa is taken orally and is absorbed through the small intestines into the blood, competing for access with natural proteins. Additionally, once the drug has entered the blood stream, L-DOPA utilizes the same pathways to cross the blood brain barrier as natural protein (Berry et al., 1991). Only about 5 – 10% of levodopa crosses the blood brain barrier, while the remaining is metabolized elsewhere in the body. The metabolism of medications elsewhere is known to cause side effects such as nausea, dyskinesias, and stiffness (Bronstein, 2011). In order to improve the effectiveness of PD drugs such as L-DOPA, a diet low in excessive protein is recommended since L-DOPA competes with these dietary proteins for access to the blood and brain. It is therefore

recommended that the drug be taken so that it is not affected by digestion. It is recommended to take L-DOPA ideally 30 minutes before eating or at least 1 hour afterwards. A protein redistribution diet is sometimes recommended in which most protein should be eaten in the afternoon (Leader, 2006).

**4. Conclusion**

It is important for the parkinsonism patient to maintain a balance between diet intake and physical activity. Balanced diet (nutritious plate) including all the essential micro and macro nutrients should be given to patient. High biological value proteins should be included in the diet of patient but there should be a gap of 30 minutes from intake of Levodopa. A high protein diet, however, may limit levodopa's effectiveness. Physical activity is an essential component of parkinsonism patient. Exercising help people improve their mobility, stiffness and increase range of motion. It is advisable to practice these exercises in proper regime in the presence of physiotherapist. Home programs are also taught by physiotherapist to patients. Exercises also improve balance, helping people overcome gait problems, and can strengthen certain muscles so that people can speak and swallow better. Exercises can also improve the emotional well-being of parkinsonian patients by giving them a feeling of accomplishment.

**5. Future Scope of this Study**

As one ages, gentle exercise must be performed to maintain muscle mass and strength. Muscle mass and strength allow an individual to complete daily chores and to maintain balance. Additionally, strengthening postural muscles may help to maintain a good posture and avoid Kyphotic posture in old age. Integrative, functional exercises other than weight-training may strengthen muscles in ways that are more beneficial to individuals with Parkinson's disease. This paper provides relevant information regarding exercise and diet intervention during Parkinsonism disease. This paper is an attempt to clear myths related to food intake in Parkinsonism. The paper was prepared in order to make patients aware of exercise and diet benefits. For many people living with Parkinson's, exercise can prevent the loss of independence that comes with progressive mobility problems. It helps Patient not living confined and unable to enjoy daily activities.

The need of the hour is to determine strategies to prevent the occurrence of stiffness, disability, loss of independence and diet related complications to some extent among Parkinson's patients, which will further increase their range of motion, strength as well as help to combat stress levels and enable them enjoy their life. This requires concentrating both at home and at physiotherapy centers and diet clinics where patient spend most of their time. Encouraging physical activity and healthy dietary habits, such as increasing fiber intake, reducing the consumption of processed food and increasing levels of physical activity can prove beneficial for the health of patients.

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