GET MOVING TO KEEP MOVING: The Effectiveness of Exercise in Parkinson’s Disease

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CASE STUDY

Edward is 74 and has Parkinson's Disease (PD). He lives with his wife. He was a successful amateur middle distance runner, retiring 5 years ago, is a keen walker and worked part time as a sports coach at the local athletics club before his diagnosis. One of his main problems is decreased walking endurance and reduced walking speed.

THEORETICAL BACKGROUND

- Parkinson's Disease is a progressive and disabling degenerative disorder that is characterised by bradykinesia, tremor, rigidity and postural instability. Patients frequently have gait impairments and difficulty in linking movements together smoothly. (Merholz et al., 2010)
- There are around 127,000 people with the condition in the UK (www.parkinsons.org.uk). The Royal College of Physicians (RCP) and National Institute for Clinical Excellence (NICE) guidelines from 2006 recommend physiotherapy intervention for PD patients, to include exercise and therapy for restoration or compensation of function.

- The early loss of dopamine in the caudal regions of the basal ganglia leads to diminished automatic and increased cognitive control of movements, (Petzinger et al, 2013) The impaired basal ganglia function has an inadequate effect on the cortical motor centres which leads to reduced activation of motor neurons and therefore muscle weakness, (Grending et al, 1997)
- Despite optimal medical and surgical therapies for PD, patients develop progressive disability, (Deane, 2001) The effects of exercise are well recognised in the PD population and inclusion of exercise in the PD programme is encouraged, (Falvo, 2007)

- The principles of exercise can affect neuroplasticity in those with PD in several ways:
  1. Intense activity maximises synaptic plasticity
  2. Complex activities promote greater structural adaptation
  3. Rewarding activities increase dopamine levels and therefore learning / relearning is promoted
  4. Dopaminergic neurones are highly responsive to exercise and inactivity and exercise therapy is effective in reducing fluctuations and dyskinesia in PD patients (Disease). (Fox et al, 2006)

LITERATURE REVIEW

1. To improve endurance so Edward is able to walk longer distances – 6 Minute Walk Test (6MWT) – Measures endurance by the patient having to cover as much ground as possible in 6 minutes – continually but can rest. Tyson and Connell (2009) reported the 6MWT to be a robust measure for measuring mobility in clinical practice

2. To improve functional walking speed – Timed Up & Go (TUG) – Morris et al (2001) found TUG to have high retest reliability and inter-rater reliability in PD

3. To maintain level of function - Unified Parkinson's Disease Rating Scale (UPDRS) – 4 sections assessing mood, ADL's, motor function – Siderowf et al (2002) RCT of 404 subjects, found that UPDRS has excellent test-retest reliability and reported that previous studies have shown UPDRS to have high internal consistency

GOALS & OUTCOME MEASURES

- Exercise Intervention

Study | Methodology | Methodological quality | Results | Comments
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Schramm et al (2002) | Examining the potential benefits of exercise interventions for those with moderate to late stage PD | 14 experimental, randomised design studies, 485 participants (31-142, 67% male) | Used scale to give numerical quality score to studies | NVP studies reported a statistical significant benefits in favor of exercise in the physical functioning domain | Large variation in interventions therefore difficult to compare

Mehrota et al (2010) | Assessing the effectiveness and acceptability of treadmill training for gait disorders in people with PD | Meta analysis of studies that measured the same treatment effect | Outcomes examined – walking speed, cadence and endurance | 8 trials, 213 participants (10-54 sample size) | Positive effect for exercise, but reported with caution

Systematic Review

Study | Methodology | Methodological quality | Results | Comments
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Scherer et al (2012) | To compare short and long term effects of 8 supervised exercise sessions with a control programme for those with early to mid stage PD, 12 participants | 4, 10 and 16 month TUG flexibility/balance/function group (FB) | Usually described times of days | 46 months the FB group had most improved ADL scores | Study done in Colorado, which is described as being one of the states in USA – Transferability of results

Schiele et al (2013) | RCT | Data collection at optimum time period and 6 months | Heterogeneous group, good retention rates 88% at 6 months, 78% at 16 months | At 4, 10 and 16 months the FB group had the most improved walking economy | Resource intensive programme – approximately 3 months for 4 months, tapered supervision for 1 month, x1 month for 16 months, control x1 month for 16 months

CLINICAL INTERVENTION

1. yogurt exercise is ambiguous term in PD, as demonstrated in the review by Goodwin et al, 2008 and the 2001 Cochrane Review by Deane et al

2. The available literature describes varied interventions, methodological designs and limitations, therefore it is difficult to establish from the evidence what to implement and at what stage of the disease it is most beneficial to implement.

- Therefore pertinent to supplement evidence base by looking at smaller studies for evidence of improvements – studies with quasi-experimental / pilot / feasibility designs assessing specific interventions in this patient group.

- From the evidence, it would be recommended that a structured, regular exercise programme should be provided, preferably from diagnosis, in order to maintain function and influence the neuromuscular changes described. The programme needs to consist of a combination of aerobic, flexibility and strength elements (see photographs above) and the most positive results will likely be gained if exercise is completed in group situations with regular monitoring to maintain motivation/progression.

RECOMMENDATIONS

- Ensure providing a variety of interventions – will ensure neuroplasticity occurs if both goal based and aerobic in nature

- Analyse and audit the current service and exercise class – alter some of the exercises and outcome measures to ensure patients gaining most from the sessions and that this is being measured accordingly, then re-audit to complete the process

- Liase with community services to ensure opportunities are available to PD patients to self manage / manage with supervision to encourage and progress

- Assess feasibility of conducting a small RCT to establish effectiveness of aerobic exercise class v’s 1.1 and home exercises and the costings of both for the NHS service

REFERENCES


- Photographs provided from content and in accordance with East Cheshire NHS Trust policy.