

Exercise Guidelines for People with Polio: *A Guide for Physiotherapists*



POLIO
SERVICES
VICTORIA

A Polio Services Victoria Production

Published October 2005

Introduction

Polio is an anterior motor horn cell disease, which can lead to partial or complete muscle paralysis. Between 25 – 75% of paralytic polio survivors develop post-polio syndrome (PPS), which is characterised by new or increased muscle weakness, fatigue or pain. Exercise prescription for people with polio is different compared to non-polio sufferers and this must be considered when prescribing exercise for this population.

Pathophysiology of Affected Muscles

In the acute stage of polio when motor units are destroyed, surviving motor units sprout axons to reinnervate the denervated or “orphaned” muscle fibres. This process of denervation and reinnervation is ongoing over the muscle lifespan. As a consequence, polio-affected muscles have oversized motor units and increased muscle fibre density. However, physical symptoms such as weakness and pain may remain stable for many years. Later in life, new disabling problems may emerge for people with a

history of polio. These can be described as PPS or the “Late Effects of Polio” (LEOP). A possible mechanism for the development of new muscle weakness or fatigue in this population is a reduction in the functioning motor unit pool. There is emerging evidence that when a critical threshold is reached, motor neuron reinnervation can no longer keep pace with denervation. As a consequence polio-affected muscles become deinnervated and clinically, a disproportionate decline in function is observed.

Exercise Considerations

Muscle strengthening may be performed in muscles with residual poliomyelitis weakness, however strength gains may be slower or limited compared to muscles unaffected by polio. Clearly, no strength can be achieved in completely paralysed muscles after the acute period because the motor units are completely destroyed and the damage is permanent.

Polio affected muscles are more susceptible to fatigue and have a prolonged recovery time compared to unaffected muscles. This may be explained by the increased workload on remaining motor units, which are compensating for lost motor units that were destroyed by polio. Individuals with PPS are even more susceptible to muscle weakness and fatigue, therefore more caution should be taken with exercise prescription.

Some individuals with polio are anxious about exercising because early anecdotal studies revealed loss of strength with exercise (due to excessive activity) and the press advised against exercise. Contrary to earlier studies, research within the last 20 years demonstrates that modified exercise is beneficial for the polio population with or without PPS and that it has no adverse affects. Although modified exercise has been shown to be beneficial, the current research is inconclusive regarding specific exercise prescription. The general exercise guidelines provided here have been extrapolated from the available literature and clinical experience with polio patients.

Exercise Guidelines

- Low-moderate intensity
- Short duration
- Regular rests, with adequate time for muscles to recover
- Do not exercise to point of muscle fatigue
- Monitor changes in fatigue, muscle soreness and weakness and let this guide exercise prescription

Exercise Guidelines for People with Polio: *A Guide for Physiotherapists*



POLIO
SERVICES
VICTORIA

A Polio Services Victoria Production

Published October 2005



POLIO
SERVICES
VICTORIA

St Vincent's Hospital Melbourne

Bolte Wing
14 Nicholson Street
Fitzroy, 3065
☎ 9288 3900
☎ 1800 030 324
Fax 9288 3808
E-mail:
psv@svhm.org.au

Multidisciplinary Team:

Rehabilitation Medicine
Specialist
Physiotherapist
Orthotist
Occupational Therapist

Clinics:

Specialist Assessment
Treatment Planning

Metropolitan
Regional

Exercise Guidelines

Be aware that exercise programs for polio patients require closer monitoring than the normal population because there is a risk of muscle weakness and fatigue due to excessive exercise. Every exercise program must be specifically tailored to the individual's functional status and needs. Exercise should not overly fatigue the patient because this may lead to an increase in chronic fatigue levels and muscle weakness, thereby decreasing the patient's functional level.

Strengthening Exercise

Manual muscle testing must be performed before and during the exercise program to closely monitor changes in muscle strength. *General recommendations for strengthening exercise are: low resistance, high repetitions and frequent rest periods of sufficient duration to allow recovery from muscle fatigue.* For example, a study showed that the following exercise program was effective: 3 low-resistance sets of 8 repetitions (with a 5 minute rest between sets), 3 times a week with a rest day between exercise days.¹

Cardiovascular Exercise

Excessive cardiovascular exercise has been shown to increase levels of chronic fatigue. However some amount of exercise is necessary for improving cardiovascular fitness. Therefore the correct level of exercise must be determined in order to gain maximal cardiovascular fitness without worsening levels of chronic fatigue. *The major principles are to exercise at a moderate (rather than maximal) intensity, have short sessions with frequent rests and have adequate recovery time between session days.* For example, one study found the following program effective: 20 minute sessions with frequent short rests as needed, 3 times a week with at least one day off in between sessions.²

Hydrotherapy is another form of exercise which has been shown to be beneficial for this population in maintaining function and providing positive social interaction.³

Please contact the physiotherapist at Polio Services Victoria for any queries regarding exercise prescription in this population. Also feel free to contact Polio Services Victoria for further information or a discussion on the articles listed below.

References

1. Chan K et al (2003): Randomised Controlled Trial of Strength Training in Post-Polio Patients. *Muscle & Nerve* 27:332-338.
2. Kriz J, Jones D and Speier J et al (1992): Cardiorespiratory Responses to Upper Extremity Aerobic Training by Postpolio Subjects. *Archives of Physical Medicine and Rehabilitation* 73:49-54.
3. Willen C, Sunnerhagen K and Grimby G (2001): Dynamic Water Exercise in Individuals With Late Poliomyelitis. *Archives of Physical Medicine and Rehabilitation* 82:66-72.
4. Dean E and Dallimore M (2005): Muscle Function and Training of Individuals with Chronic Effects of Poliomyelitis with and without Postpolio Syndrome. *Physiotherapy Canada* 57:19-32.