

Case report:

Efficacy of the Otago exercise programme as a supplementary intervention to exercise classes: On falls, balance, physical function and mobility in a patient with chronic lower back pain: A case report.

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Abstract

In the elderly, physical activity is essential in maintaining good health. In a resource constrained environment, where supervised exercise classes are conducted once a week, a suitable home exercise programme can provide the recommended weekly level of physical activity needed. The Otago Exercise Programme(OEP) is effective in the prevention of falls and increasing strength in the older adult. The efficacy of the OEP as a supplementary intervention to exercise classes; on falls, balance and health enhancing physical activity in the older adult with chronic lower back pain (CLBP) has not been reported. Mr X regularly attends the weekly land-based and aquatic exercise programme at a tertiary hospital in the public sector in Kwa Zulu-Natal. He demonstrated willingness to follow the OEP as prescribed by the Otago exercise manual as a home exercise programme and continued with other leisure, walking and activities of daily living. Post the exercise programme Mr X showed remarkable improvement in the chair to stand test, four-test balance scale and health enhanced physical activity. The OEP is effective and can be used as a supplemental programme to regular supervised exercise classes. The OEP can be beneficial for elderly patients with weakness and chronic lower back pain.

Keywords: Otago exercise programme; Chronic lower back pain; Falls; Balance

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Introduction

Patients with lower back pain have been observed to have changes in lumbosacral proprioceptive alertness¹, dysfunction in trunk muscle control, altered postural balance with a potential to falling². The underlying mechanisms of all these weaknesses in patients with chronic low back pain is still unclear^{2,3}. Pain could be a confounding factor for variability in postural tasks and may induce a loss of normal variability of the postural strategy in patients with chronic lower back pain (CLBP). This decrease in variability of postural strategy

could create further back pathology leading to postural imbalance, decreased physical function and activities of daily living^{4,5}. Pain aggravates coordination of posture leading to impaired balance and increasing the risk for falling⁶. This arises as patients with chronic low back pain have variable effects on postural activation of superficial abdominal muscles and consistent effect on postural activation of the deepest abdominal muscle which could lead to muscle imbalance and poor activities of daily living⁷. Falls associated with low back pain generally relate to instability of the spine leading to altered

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gait pattern and imbalance^{1,8}. Group or home based exercise programs for older people can be beneficial in preventing falls, improving balance and enhancing physical function^{9,10}. However, older people prefer home-based programs as this is more convenient because they do not have to travel away from home¹¹.

The global strategy of the World Health Organization (WHO)¹² makes recommendations for physical activity levels for the population who are 65 years or older. They advise older adults to engage in at least 150 minutes of moderate-intensity aerobic exercises or at least 75-minutes of vigorous intensity aerobic activity throughout the week. Older individuals with specific health conditions, such as cardiovascular disease and diabetes should take extra precautions or seek medical advice before engaging in exercises in their efforts to achieve the recommended levels of physical activity for older adults.

The Otago exercise programme (OEP) is effective in increasing strength and preventing falls in older adults with co-morbidities. However, the intervention of delivering the OEP as a supplemental intervention to supervised land and aquatic based exercise classes has not been tested.

Since older patients with CLBP often present with mobility and balance problems the OEP could be effective in increasing strength, balance and be ideally suited for these patients. Additionally, the impact of this interventions has not been assessed in relation to balance re-education, strength, physical function and mobility. Based on this the objective of this study was to evaluate the effects of OEP when used as a home programme supplemented with weekly supervised exercise classes. These classes were conducted weekly with 30 minutes of land- based exercises followed by 30 minutes of aquatic exercises. The classes required patients exercising at a level of 13 scored at “somewhat hard” based on the Borg Scale of Perceived Exertion. The exercise classes included activities such as stretching, strengthening and aerobic components. If the data from this study is positive and has benefit than this may motivate other older patients with CLBP to engage with the OEP at home and in addition attend weekly classes at the healthcare facility.

Case report

This case study is based on Mr X who lives close

to the healthcare facility and attended weekly supervised exercises for over 10 years at the Physiotherapy Department. In June 2016 he indicated an interest in continuing with the OEP at home. Mr X is an unmarried 77 years old individual with a history of chronic lower back pain since 2014. He was initially managed at the orthopaedic clinic in the hospital and referred for physiotherapy. His past medical history includes: an appendectomy as a child; 2 incidences of deep vein thrombosis (DVT) on the left leg with the first being in 1997 on a flight to Australia. He was prescribed warfarin and continues with this to date. He had two episodes of myocardial infarction in December 1997 and January 1998; experienced bilateral subdural hematomas in 2009 and was managed by neurosurgery for the evacuation of subdural hematomas; had gout which is being controlled by modification of his diet; bilateral osteoarthritis (OA) of the knee for the last 12 years with a left total knee replacement in 2014; also diagnosed with benign prostatic hyperplasia in 2015 and is presently managed for this at the urology clinic. Mr X currently receives treatment at the orthopaedic, urology and physiotherapy clinics.

Method

Mr X gave written consent to participate in the study and was informed of the procedure, rationale and benefits of the programme. This would require him to follow the OEP and continue with his regular weekly exercise class. After assessing and individually tailoring the programme to meet variations in his physical capacity and health he was monitored to ensure he performed the exercises safely and confidently with correct movement patterns. Due to resource constraints the researcher did not visit the patient at home but adapted the execution and monitoring. This was done by Mr X being evaluated before the OEP commenced and intermittently over a 12- month period as outlined in the OEP manual by telephonic or monitoring of the patient’s progress. Where the manual indicated a “home visit” the patient was booked in on the day of his routine class attendance and his progress reviewed. The Chair Stand Test, Four-Test Balance Scale and the Short Questionnaire to assess health enhancing physical activity (SQUASH) were used for the assessment prior to the OEP and after 12 months of commencing the programme.

The OEP included the following exercises: knee extension and knee flexion, hip abduction, calf raises, toe raises, sit to stand, semi squats from a standing position, tandem stand, tandem walk, sideways walking, backwards walking, heel walking, toe walking, one leg stand, and walking and turning around. Mr X performed 10-20 repetitions of the exercises, three times per week at home and progressed as per the OEP. He was encouraged to continue with the exercises and with leisure, walking and household activities.

Results

There were no falls reported during the 12 months of the study.

Outcome Measures

Outcome	Pre- OEP Intervention	Post- OEP intervention
Chair stand test	16 sec	10 sec
Four test balance scale	Semi tandem stand	Tandem stand
SQUASH		
Mobility	Uses a rollater Walks with a stooped posture Slow pace	Walks unaided over short distances &uses a stick over long distances Erect posture Moderate pace
Leisure time activities	Gardening for 3 hours per week Light effort Walking for 45 min per day Slow pace	Gardening for 6 hours per week Light effort Walking for 45 minutes per day Moderate pace.
Household activities	Point five (0.5) hours per day of light household work	Point five (0.5) hours per day of light household work.

Discussion

There is strong evidence to support the use of exercise programmes for improvements to balance, physical function and strength to reduce the risk of falling in older people^{9,10,13}. However there seems to be a lack of evidence to support home based exercise programmes to reduce falls and increase balance and strength in older patients although exercises are a common intervention for treating chronic back pain and disability for this population¹³. There is support for home-based exercise programmes to be more acceptable to older people compared to group-based

exercise programs¹⁰. Although supervised exercise classes are beneficial the “Train Pain Academy” in South Africa recommends the implementation a of 6-week chronic pain management group (CPMG) therapy with an emphasis on multidisciplinary education and exercises. The reason for this is that patients with chronic pain undergoing this therapy with a multidisciplinary and education focus could become “Pain Champions” in their community. This is supported by this case study because Mr X lives in a retirement village. Following his participation in this study he interacted with the nursing staff in his village and now they conduct OEP with the aged in their village. This has showed positive benefits in access to exercise for the community as well as improved adherence for these individuals participating in the programme. The home base exercises have reduced the risk of falls in these participants as noted by the results of the sit to stand chair test. In addition, there was an increase in leisure time activities, an improvement in mobility and in standing balance. However, there was no change in house-hold activities. The programme has shown the efficacy of home-based exercise programmes in preventing falls and increasing strength and improving balance in older individuals. Also, there were positive outcomes for time spent with leisure activities and improvements in mobility. This indicates an improvement in physical function which results in a better quality of life for participants. Clinically this programme may also benefit patients in terms of reduced fall-related injuries, health problems arising from complications of injuries resulting from falls, decreased levels of pain and improved activities of daily living and overall quality of life.

Generally, in the public health setting, large numbers of patients with chronic pain access the facilities. A CPMG intervention of at least 6 weeks supplemented with the OEP as a home exercise programme will encourage the patient to make physical activity part of their lifestyle. Those patients who comply and complete the programme can be transitioned into the community by attending the CPMG and become “Pain Champions” in their community. This will facilitate patient empowerment, encourage them to integrate socially into their community and improve their quality of life.

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