



Case Report

Stabilization and Balance Exercise Benefits in Amyotrophic Lateral Sclerosis: A Case Report

Amin Kordi Yoosefinejad, Fatemeh Jabari, Mahnaz Setooni*

Department of Physiotherapy, School of Rehabilitation Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

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ABSTRACT

Background: ALS is the most devastating form of motor neuron disease, and the chance of survival is 3 to 5 years after the diagnosis is made. The pathogenesis of the disease is unknown. Several upper and lower motor neuron symptoms such as weakness, gait bradykinesia, and muscle atrophy have been reported. The core muscles are considered to be the center of the functional kinetic chain due to the links with upper and lower limbs.

Methods: The patient in this case study was a 42 year-old woman suffering from ALS for two years prior to the study. She had typical upper and lower motor symptoms, but her chief complaints were inability to walk, standing balance impairment, and a tendency to fall posteriorly. She performed core stabilization exercises, which were done three times per day. She was followed for three months.

Results: Core stabilization exercises improved her quality of life, and she could walk independently after three months of exercise. In addition, her tendency toward falling posteriorly was completely alleviated.

Conclusion: Core stabilization exercises were beneficial to the patient, and she was satisfied because her quality of life had improved.

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Introduction

Amyotrophic Lateral Sclerosis (ALS) is a motor neuron disease that often times results in death 3 to 5 years after the diagnosis [1-3]. Its pathogenesis is still unknown [4]. The primary motor cortex, cortico-spinal pathways, brain stem, and spinal cord degenerate progressively. In addition to neural system degeneration, upper and lower motor neuron symptoms such as weakness, progressive muscular fatigue, gait bradykinesia, spasticity, muscle atrophy, dysarthria, and dysphasia occur [5-7]. The onset of the symptoms has two discrete categories. In spinal form (i.e. limb onset), symptoms include weakness, fatigue, spasticity, and gait disorder, and the patient is exposed to respiratory complications for 3 to 5 years

after the diagnosis. The other form is associated with bulbar onset, and is manifested with dysphasia and dysarthria. Lower and upper limb symptoms deteriorate simultaneously. In this group, respiratory failure causes death from 2 to 3 years after diagnosis [8].

The management of ALS is supportive and palliative [4,8]. Whether or not physical activity is suitable to improve the quality of life in ALS sufferers is controversial. Kirkinezos et al. suggested that a regular exercise program has a positive effect on the progression of disease [9]. Drory et al. demonstrated that a regular exercise program has a positive short-term effect on the disability, motor deficit, and health related quality of life of ALS patients, and they recommended regular exercise for ALS sufferers [10].

The core is the central part of body and consists of 29 pairs of muscles [11,12] that support the lumbo-pelvic-hip complex and stabilizes the pelvis and spine during body motions. The core is considered to be a box with

*Corresponding author: Mahnaz Setooni, BSc, Department of Physical Therapy, School of Rehabilitation, Sheikh Abivardi 1, Abivardi Blv., Shiraz, Iran, Tel: +98 9171280473, E-mail: setooni_m@sums.ac.ir

the abdominal muscles in front, para-spinal and gluteal muscles posteriorly, and the pelvic floor and diaphragm as the base and roof of the box respectively [11].

The core is considered to be the center of the functional kinetic chain [13,14]. Multi-joint muscles of the core link it to the pelvis, shoulder, legs, and arms [15]. Integration of core muscles provides spinal stability. Stability is essential for maintaining posture, bending, twisting, and limb movements [11]. Therefore, core stability is an essential component to be considered in clinical rehabilitation [13], and core muscle exercise is an indispensable part of the rehabilitation of musculoskeletal disorders [14].

To the best of our knowledge, the balance, strength, and endurance of core muscles have not been evaluated in ALS sufferers; therefore, the aim of this preliminary study is to investigate the effects of a four-week core stabilization exercise program on ADL improvement in a patient with ALS.

Case Report

The patient was a 42 years old woman diagnosed as ALS two years prior to the study. The diagnosis was confirmed with EMG, NCV, and MRI findings. The patient was referred to the physical therapy department with a chief complain of weakness in the limbs and early fatigue. She complained of dysphasia and dysarthria, and also from the inability to stand independently.

Upper and lower limb weakness, tongue fasciculation, and excessive posterior sway during standing were obvious once the patient was evaluated. She walked with a narrow base and short steps while using a walker. The patient complained of permanent leg cramps. She also suffered from psychological problems such as insidious laughing or crying.

At the beginning of the rehabilitation program, core stability exercises were explained to her thoroughly. The exercises included abdominal hollowing in the supine position with the knees flexed and diaphragmatic breathing exercises. The patient carried out the prescribed exercises of 3 sets per day, each set consisting of ten repetitions. She continued performing the exercises for one month.

Parallel bar walking training was also conducted. Core stability assessment was carried out objectively by evaluating her standing ability while catching and throwing a ball, and subjectively by asking her the success rate during ADLs every two weeks for 3 months.

After two weeks, the patient could stand independently without any tendency to fall posteriorly for a few seconds. The patient began catching and throwing a ball as a daily exercise program. She could catch the ball three times without any difficulty while maintaining standing balance.

Standing balance improved more the following week, and the patient could catch and throw the ball 8 times successively without losing her balance. She could maintain the standing posture with minimal effort. The tendency to fall posteriorly was alleviated completely.

A month later, some negative signs were observed without any known cause, which might be attributed to

fatigue or to the progressive nature of the disease. She could not perform the previous tasks as successfully as the previous month.

Two weeks later, the patient was assessed again, and she could stand for approximately two minutes while catching and throwing a ball. She reported no tendency of falling posteriorly.

During the last follow up session, she claimed significant improvement in her ADLs such as washing the dishes and walking independently.

Discussion

It is documented in the literature that daily range of motion (ROM) and stretching exercises can improve the function of patients suffering from ALS [16,17]. Stretching exercises have a potential role in maintaining muscle strength and delaying functional impairment. In addition, aerobic exercise improves the quality of life and function [17].

Disability, weakness, and Health Related Quality of Life are temporarily attenuated in ALS patients following regular and mild to moderate physical activity. These exercises have positive effects on muscle endurance, without any change in muscle strength because of the increased potential of oxidative metabolism [10].

Core stabilization exercise was applied for the patient to maintain the function of the muscles and to increase spinal stability [18]. As implied before, integration of core muscles provides spinal stability. Local stabilizers such as the transversus abdominis play an essential role in lumbar stabilization during dynamic movements, but all core muscles have an important role for the stability of lumbar region.

Conclusion

Prescribing a 4-week stabilization exercise program improved the standing balance and gait quality, and also increased the success rate of doing ADLs in a patient suffering from ALS.

Conflict of Interest: None declared.

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