Iran J Public Health, Vol. 50, No.1, Jan 2021, pp.209-210

Letter to the Editor

Neurorehabilitation, the Practical Method of Returning to Work after Stroke

Vahide MORADI [1], Hossein MAFI [2], *Ardalan SHARIAT [3], Joshua A. CLELAND [4], Noureddin NAKHOSTIN ANSARI [3,5], Sahar SAVARI [2]

1. *Department of Orthotics and Prosthetics, School of Rehabilitation Sciences, Iran University of Medical Sciences, Tehran, Iran*
2. *Department of Motor Behavior, Faculty of Physical Education and Sport Science, University of Tehran, Tehran, Iran*
3. *Sports Medicine Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran*
4. *Department of Public Health and Community Medicine, School of Medicine, Tufts University, Boston, USA*
5. *Department of Physiotherapy, School of Rehabilitation, Tehran University of Medical Sciences, Tehran, Iran*

***Corresponding Author:** Email: ardalansh2002@gmail.com

(Received 10 Jul 2019; accepted 27 Jul 2019)

Dear Editor-in-Chief

Stroke is one of the most common causes of death and disability worldwide. Every year, 16 million individuals suffer a stroke in the world (1). Despite the strong association between the age and major risk factors of stroke, the incidence is increasing among young people. Approximately 20–30% of patients who suffer a stroke are younger than 65 yr (2). Stroke affects not only the health of individuals but also greatly affects their activities of daily living (ADL), financial situation and their jobs. Complications after stroke are very debilitating and the morbidities affect general health status of the patients (3). Having a job solves the financial, social, and personal needs of individuals including patients post-stroke. Returning to work (RTW) is one of the main factors improving quality of life, financial status and satisfaction of work among this population. Success in returning to work after a stroke is associated with increased self-esteem and quality of life (2,4). Hence, returning to work should be among the main goals of rehabilitation in young patients post stroke. According to a 6-yr follow up the rate of return on work was 48.3% after one year of suffering a stroke and 74.7% within the 6 yr of its onset. In addition, RTW could happened even up to three years after stroke (3).

Despite the importance of RTW in patients post stroke, there are limited rehabilitation programs with a focus on this aim. Recognizing the factors impacting RTW is the basis of designing a neurorehabilitation program. Improvements in the ability of walking and muscle weakness have been introduced as effective factors in facilitating RTW. The increase in physical activity level is the first key factors in returning to work (5). Accordingly, as long as individuals do have dependency in daily activities (such as walking, sitting, etc.), they cannot return to work (5).

The key to designing a stroke treatment plan and preventing its long-term complications is to have a multidisciplinary approach. Recently, neurorehabilitation programs concentrate on different tasks to helping patients with neurological problems including post-stroke.

There are various forms of treatments targeting the post stroke complications. The existing treatments are divided into pharmacological and non-pharmacological categories. There are many non-pharmacological treatments such as muscle stretching, inpatient or outpatient occupational therapies, gait training and electrical stimulation

(6). Among such treatments, functional electrical stimulation (FES) which is a form of electrical stimulation that can improve motor control. FES could enhance individual's function and ability to walk even in the chronic stage after stroke. Unlike the claims based on the effectiveness of aforementioned neurorehabilitation interventions in returning to work (6), there is a lack of studies that have been designed specifically to evaluate their efficiency on RTW. FES combined with other established modes of rehabilitation, such as cycling or gait training, has the potential to improve muscle recruitment and motor outcomes post-stroke and as such, potentially lead to increased performance and participation in ADLs. Considering the positive effect of FES and cycling on increasing the level of physical function in returning to work after stroke (6) it seems that planning a structural therapeutic package based on the use of FES in these people is essential.

The purpose of this package is to improve the ability to walk and accelerate the process of returning to work in patients post-stroke. The appropriate time to complete this therapy is a three sessions weekly for 5 weeks; each session time varies from 15 to 45 min depending to the initial walking ability for each patient. For this process, eight FES electrodes can be used on the quadriceps muscle, gluteus maximus, hamstring and tibialis anterior. We suggested that the FES should be set with pulse width of 200-400 μs, stimulation frequency of 25-50 Hz, and the amplitude should produce muscle activity (based on the patients' acceptable tolerance). Functional electric stimulation should begin in the supine position and while recumbent cycling progressing to walking in the parallel bars. The last rehabilitation phase can be the use of FES while walking on the treadmill.

As a take-home message, neurorehabilitation after stroke containing FES training for the aim of returning to work is new and designed to improve their quality of life. This type of step by step concurrent electrical stimulation and muscle training in rehabilitation can improve the ability to walk, enhance the individual's independency in their ADLs. It can also reduce the fatigue, physical disabilities and improves cardiovascular health after stroke. Reducing the muscle spasticity, normalizing gait patterns and cognitive improvements are other positive effects of this mentioned neurorehabilitation method. All these improvements can enhance not only the quality of life for the affected people, but also financial benefits for governments and employers (7,8).

Conflict of interest

The authors declare that there is no conflict of interest.

References

1. Di Carlo, A (2009). Human and economic burden of stroke. *Age Ageing*, 38(1):4–5.
2. Larsen LP, Biering K, Johnsen SP, et al (2016). Self-rated health and return to work after first-time stroke. *J Rehabil Med*, 48(4):339–45.
3. Westerlind E, Persson HC, Sunnerhagen KS (2017). Return to work after a stroke in working age persons; a six-year follow up. *PLoS One*, 12(1):e0169759.
4. Arwert HJ, Schults M, Meesters JJL, et al (2017). Return to Work 2–5 Years After Stroke: A Cross Sectional Study in a Hospital-Based Population. *J Occup Rehabil*, 27(2):239–246.
5. Edwards JD, Kapoor A, Linkewich E, et al (2018). Return to work after young stroke: A systematic review. *Int J Stroke*,13(3):243–256.
6. Shariat A, Ansari NN, Shaw BS, et al (2018). Cycling training and functional electrical stimulation for post-stroke patients. *Rev Brasil de Med Esport*, 24(4):300–302.
7. Shariat A, Najafabadi MG, Ansari NN, et al (2019). The effects of cycling with and without functional electrical stimulation on lower limb dysfunction in patients post-stroke: a systematic review with meta-analysis. *NeuroRehabilitation*, *44*(3), 389-412.
8. Hakakzadeh A, Shariat A, Honarpishe R (2019). Concurrent impact of bilateral multiple joint functional electrical stimulation and treadmill walking on gait and spasticity in post-stroke survivors: a pilot study. *Physiother Theory Pract* ,1-9.