Omo Neurexa

Functional tests

Major Findings

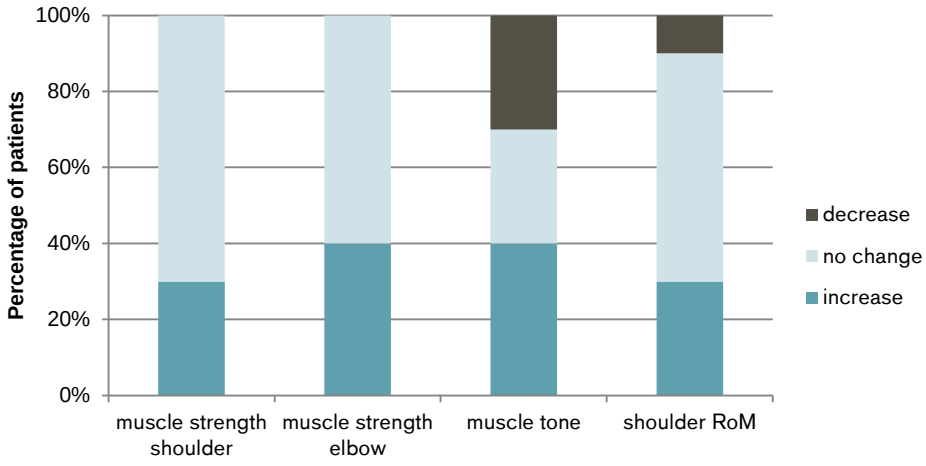
With Omo Neurexa compared to no orthotic treatment:

→ **The muscle strength (MRC score) increased significantly** (Hesse et al. 2013)
- 30% of patients showed an increase in shoulder strength (Hesse et al. 2009)
- 40% of patients showed an increase in elbow strength (Hesse et al. 2009)

→ **Minor changes in muscle tone assessed on Ashworth scale**
- 30% of patients showed a decreased Ashworth score (reduction of spasticity) (Hesse et al. 2009)
- 40% of patients showed an increase in the Ashworth score (development of flexor spasticity) (Hesse et al. 2009)
- The muscle tone on Ashworth scale remains constant (Hesse et al. 2013)

→ **Tendency towards an increased shoulder RoM (Range of Motion)** (Hesse et al. 2013)
- 30% of patients showed an improvement in passive RoM (Hesse et al. 2009)
- 10% of patients showed a deterioration in passive RoM (Hesse et al. 2009)

With Omo Neurexa improvements in functional tests was observed



(Hesse et al. 2009)

Clinical Relevance

"Stroke is the most frequent cause of permanent impairment in the industrialized world (Hesse et al. 2009)." Fifteen million people suffer from stroke every year worldwide, five million die and another five million are left with permanent disability (WHO report 2009). An ischemic stroke may lead to a hemiparesis, accompanied by abnormalities of muscle tone (identified as spastic hypertonia or spasticity), muscle weakness and impaired muscular coordination (movement dysfunction) (Dewald et al. 2001, Sabut et al. 2011).

Muscle weakness is a significant consequence of stroke. Reduction of muscle strength is due to the combined effects of the upper motor neuron lesion and secondary adaptations due to denervation, disuse and inactivity and, in some individuals, the effects of aging. Muscle strength is directly related to functional performance. (Ng & Shepherd 2013)

The major clinical problems related to spasticity after stroke are mobility decrease and hypertonus, resulting in a range of motion (RoM) restriction, abnormal postures, pain and fixed contractures, with poor response to physiotherapy (Reiter et al. 1998).

The recovery of upper limb function is of great importance in improving the patients' quality of life and helping them maximize their independence (Kwakkel et al. 2003). Rehabilitation can help to ease symptoms, and restore upper limb function. Assessment of recovery is an important aspect of any rehabilitation program. (Bai et al. 2014)

The Ashworth scale is the most popular clinical measure of muscle spasticity and resistance to passive movement (Ansari et al. 2009).

The Medical Research Council (MRC) Scale for muscle strength grades the muscle strength from 0= "no movement is observed" to 5= "muscle contract normally against full resistance". (Paternostro-Sluga et al. 2008)

Summary

Two studies evaluated the effectiveness of the Omo Neurexa:

The muscle strength evaluated with the MRC score could be increased in the shoulder and elbow muscles in 30-40% of patients as well as the range of motion in the shoulder joint. Accordingly, the muscle tone, assessed with the Ashworth scale remains constant (Hesse et al. 2009, Hesse et al. 2013).

References of summarized studies

Hesse, S., Bardeleben, A., Rembitzki, I., Werner, C. (2009). Klinische und ganganalytische Befunde zur Schulterorthese Omo Neurexa. Clinical and Gait Analysis Data on Shoulder Orthosis Omo Neurexa. *Orthopädie-Technik*, 3: 177–181.

Hesse, S., Herrmann, C., Bardeleben, A., Holzgraefe, M., Werner, C., Wingendorf, I., Kirker, S. (2013). A new orthosis for subluxed, flaccid shoulder after stroke facilitates gait symmetry: A preliminary study. *Journal of Rehabilitation Medicine*, 45 (7): 623–629. DOI: 10.2340/16501977-1172

Other References

Ansari, N. N., Naghdi, S., Arab, T. K., & Jalaie, S. (2008). The interrater and intrarater reliability of the Modified Ashworth Scale in the assessment of muscle spasticity: limb and muscle group effect. *NeuroRehabilitation*, *23*(3), 231-237.

Bai, L., Pepper, M.G., Yan, Y., Spurgeon, S.K., Sakel, M., Phillips, M., (2014). Quantitative Assessment of Upper Limb Motion in Neurorehabilitation Utilizing Inertial Sensors. TNSRE-2013-00273.R2. https://kar.kent.ac.uk/47726/1/TNSRE-2013-00273%20R2-Final_Version.pdf

Dewald, J. P., Sheshadri, V., Dawson, M. L., & Beer, R. F. (2001). Upper-limb discoordination in hemiparetic stroke: implications for neurorehabilitation. *Topics in stroke rehabilitation*, *8*(1), 1-12.

Kwakkel, G., Kollen, B. J., van der Grond, J., & Prevo, A. J. (2003). Probability of regaining dexterity in the flaccid upper limb impact of severity of paresis and time since onset in acute stroke. *Stroke*, *34*(9), 2181-2186.

Ng, S. S., & Shepherd, R. B. (2013). Weakness in patients with stroke: implications for strength training in neurorehabilitation. *Physical Therapy Reviews*.

Paternostro-Sluga, T., Grim-Stieger, M., Posch, M., Schuhfried, O., Vacariu, G., Mittermaier, C., ... & Fialka-Moser, V. (2008). Reliability and validity of the Medical Research Council (MRC) scale and a modified scale for testing muscle strength in patients with radial palsy. *Journal of rehabilitation medicine*, *40*(8), 665-671.

Reiter, F., Danni, M., Lagalla, G., Ceravolo, G., & Provinciali, L. (1998). Low-dose botulinum toxin with ankle taping for the treatment of spastic equinovarus foot after stroke. *Archives of physical medicine and rehabilitation*, *79*(5), 532-535.

Sabut, S. K., Sikdar, C., Kumar, R., & Mahadevappa, M. (2011). Functional electrical stimulation of dorsiflexor muscle: effects on dorsiflexor strength, plantarflexor spasticity, and motor recovery in stroke patients. *NeuroRehabilitation*, *29*(4), 393-400.

WHO report. Cardiovascular diseases: Facts about cardio- vascular diseases, 2009. [Online] http://www.who.int/mediacentre/factsheets/fs317/en/index.html.