

# Massage Therapy for Post-Stroke

Subjects: Health Care Sciences & Services

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Stroke is a leading cause of long-term adult disability. The individuals that have suffered from a stroke present various upper motor neuron syndrome, signs and symptoms, including weakness, spasticity, lack of coordination and agonist antagonist co-contraction, with up to 50% of survivors being chronically disabled. They involve together in impairments and functional problems that can lead to costly complications. Physical therapy may contribute to the improvement of disabilities and quality of life in these individuals.

Keywords: massage therapy ; stroke ; motor function ; spasticity ; Tuina ; soft manipulation

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## 1. Introduction

Manual therapeutic massage is the most applied type of passive physical therapy and it is one of the oldest forms of medicine known to humanity, having been practiced worldwide since ancient times <sup>[1]</sup>. All massage manipulations introduce mechanical forces into the soft tissues by means of “mechanotransduction” <sup>[2]</sup>. Massage can increase muscle mass temperature and blood flow, and this might help to increase muscle compliance and minimize muscle stiffness <sup>[3]</sup>. There are several kinds of therapeutic massage. The most common type of massage in the Western world is Swedish massage. This is one of the common treatments for provide optimal performance among athletes, and is based on the Western concepts of anatomy and physiology <sup>[4]</sup>. It involves the systematic application of manual pressure and the movement of soft tissue, with rhythmical pressure and stroking to obtain or maintain health <sup>[5]</sup>. Another type is Chinese massage (Tuina). This involves various strokes, shaking stretching and joint movement along energy channels to balance the body's energy, as well as physical and emotional system <sup>[6]</sup>. Indian massage (Dalk) includes the manipulation of body tissues with the hands. In Unani medicine, Dalk is based on the principle of *tanqiyah* (expulsion) and *imāla* (diversion) <sup>[7]</sup>. Finally, Thai massage is a form of deep massage involving brief sustained pressure on the muscles. Pressure point massage along the body's hypothesized 10 major energy channels or *Sen Sib* is believed to release blocked energy and to increase awareness and vitality <sup>[8]</sup>.

## 2. The Effectiveness of Massage Therapy for Improving Sequelae in Post-Stroke Survivors

The main findings of this systematic review and meta-analysis are that therapeutic Chinese massage (Tuina) combined with conventional physiotherapy is an effective method to improve motor function and to reduce spasticity in stroke survivors, especially in subacute stage. The combination of Tuina massage plus acupuncture also improves the symptoms. The results of this review are important, because the therapeutic massage intervention was mostly performed in the subacute stage of the stroke, with positive results in upper/lower limbs motor function. Recovery of upper limbs function remains a major scientific, clinical and patient priority <sup>[9]</sup>.

Surprisingly this review only found one study that used the Swedish massage as an intervention. It was used to decrease anxiety. This was unexpected to us, because Swedish massage is today the most popular and best-known type of massage in the Western world <sup>[10]</sup>. We expected to find more studies as other authors had used Swedish massage to improve spasticity and motor function in multiple sclerosis <sup>[11][12]</sup> and cerebral palsy <sup>[13][14]</sup>. Scientific publications in Europe, America, Africa or Australia were not found, they were only found in Asian countries, and especially in China.

The upper and lower limbs motor function was the outcome most evaluated, followed by spasticity the two outcomes are linked <sup>[15]</sup>. Motor impairments in stroke survivors can be described by a cycle of overactivity-contraction-overactivity evolving in parallel with the continuum of paresis-disuse-paresis. Both cycles must be disrupted to optimized motor recovery and function <sup>[16]</sup>. In fact, a more complete restoration of motor function is achieved when spasticity is absent <sup>[17]</sup>. It is important to reduce spasticity before the patient performs the voluntary movement in order to obtain a movement with

some quality since this will influence the neuroplasticity of the individuals and their recovery [18]. According to several authors [15][19][20] the sensory system has an important role in spasticity mitigation and is the most important predictor for severe spasticity.

The mechanism behind elastic modulus changes in spastic muscle in stroke survivors is still under discussion. One possible hypothesis might be related to structural alterations in the muscle after a stroke. Shortened muscle fascicle length in the upper limb [21] and lower limb [22] has been observed. These results suggest that altered muscle morphology of the paretic muscle may contribute to abnormal muscle elastic properties during passive stretching [23].

As a result of damages to the motor cortex and its descending pathways and the subsequent unmasking of inhibition, there is evidence of upregulation of reticulospinal tract projections excitability on the contralesional side in stroke survivors [24]. Reticular nuclei receive sensory input from the periphery and neck proprioceptors. In addition to sensorimotor integration, the reticular formation also seems to play a role in preparation for a voluntary movement [25]. Therapeutic massage increases blood flow and parasympathetic activity, releases relaxation and stress hormones, and inhibits muscle tension, and neuromuscular excitability [26]. It could reduce the hyperexcitability of the reticulospinal tracts. The various types of therapeutic massage modalities could be most useful for the therapist to reduce muscle overactivity to enable other therapeutic interventions.

The results obtained for daily living activities, gait, balance, quality of life and stroke severity were inconclusive. The trend is positive when Tuina is used in addition to the conventional therapy or acupuncture. Regarding pain, our results are consistent with the literature available [27]. There is growing evidence to support the concept of an interactive network between the cutaneous nerves, the neuroendocrine axis and the immune system [28]. Therapeutic massage is reported to have several beneficial effects, including activation of the relaxation and growth response has been suggested to be mediated by oxytocin [29]. Stroke patients suffer from anxiety and massage could be helpful for relaxation to ease the patients' suffering [30]. The results of this review show positive effects, as it reduced anxiety in stroke survivors. Surprisingly, no study evaluated the range of motion as an important aspect to take into account when reducing spasticity [31].

Functional magnetic resonance imaging data have suggested that moderate pressure massage with movement is represented in several brain regions, including the amygdala, the hypothalamus and the anterior cingulate cortex, which are all areas involved in stress and emotion regulation [32][33]. Findings from the whole-brain meta-analysis of right-hand tactile stimulation highlight the importance of taking bilateral activation into consideration, particularly in the secondary somatosensory cortex [34].

Most of the articles in this systematic review used Tuina massage for improving outcomes. This is one of the four main branches of traditional Chinese medicine. However, although its roots in China are ancient, it is still relatively new in the West [6]. Tuina massage was originated from China over 5000 years ago and is commonly known today as "the grandfather of all therapeutic massage therapies". It follows the meridian theory and works on the organs, energy channels in muscle groups and points on the body using the same principles as acupuncture, except hands and fingers are used instead of needles [35]. It is combined with anatomical and pathological diagnosis in order to achieve dredging meridian, removes pathogenic factors and has a curative effect of a harmonic balance of Yin-Yang [36]. Tuina can act on the subcutaneous muscular layer; enhance local blood circulation, lymph circulation, tissue metabolism of the skin, can regulate physiological and pathological states, unblock meridians, and harmonize Qi (total life energy). In Chinese medicine, Qi disorder and Yin-Yang imbalance account for balance disturbances following stroke. It corrects an imbalance in the yin and yang and qi (energy) which when translated into Western medical terminology, can also be understood as the "modulation of the imbalance between parasympathetic and sympathetic activity". Yin-Yang imbalance also contributes to upper and lower limb spasticity following stroke, manifesting as 'flaccidity of Yang and spasm of Yin' [37].

Tuina massage encompasses techniques as grasping, pressing, rolling, round rubbing, holding-twisting, rub rolling, pushing, kneading, rotating, shaking, wiping, vibrating, digital striking, knocking, chapping, pressing, acupressure, myofascial release, reflexology, stretching techniques and joint mobilizations applied to specific body points [38]. Tuina is a functional massage and it can input substantial proprioceptive sensory impulses to the central nervous system through muscle, tendon and joint motion [39].

No study reports adverse events, but massage therapies are not totally devoid of risks. The incidence of adverse events is unknown, but is probably low [40]. The massage itself does not increase a person's risk of stroke, but some precautions need to be taken with certain individuals. If the individual has blood clots, there is a small chance they could be dislodged by massage. Individuals on blood thinner medication bruise more easily, so deep tissue massage should be avoided. Care should be taken around the neck area in the region of the carotid artery, but this should not be an issue with an experienced massage therapist.

Further investigations are required at both the experimental and clinical levels to compare therapeutic Chinese massage (Tuina) versus Swedish massage in stroke survivors. Surprisingly, therapeutic massage is not on the list of recommendations in Western stroke management guides. Rehabilitation therapy based on integrated Chinese and Western medicine could be effective for stroke survivors <sup>[41]</sup>. Finally, touch a patient has a therapeutic value and it has many benefits <sup>[42]</sup>.

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