4. Motor Rehabilitation

4b. Rehab of Hemiplegic Upper Extremity Post Stroke

Robert Teasell MD, Norhayati Hussein MBBS MRehabMed

4.5 Recovery for Upper Extremity

• Nakayama et al. (1994) reported that for stroke patients with severe arm paresis with little or no active movement at the time of hospital admission:
  
  o 14% complete motor recovery.
  o 30% partial recovery.

• Kwakkel et al. (2003) reported that at 6 months, 11.6% of patients had achieved complete functional recovery, while 38% had some dexterity function.

• Potential predictors of upper extremity recovery include active finger extension and shoulder abduction:
  
  o Active finger extension was found to be a strong predictor of short, medium and long term post-stroke recovery (Smania et al. 2007).
  o Minimal shoulder abduction and upper motor control of the paretic limb upon admission to rehabilitation had a reasonably good chance of regaining some hand capacity whereas patients without proximal arm control had a poor prognosis for regaining hand capacity (Houwink et al. 2013).
  o The EPOS study demonstrated that patients with some finger extension and shoulder abduction on Day 2 after stroke onset had a 98% probability of achieving some degree of dexterity at 6 months; this was in contrast to only 25% in those who did not show similar voluntary motor control.
  o In addition, 60% of patients with finger extension within 72 hours had regained full recovery of upper limb function according to ARAT score at 6 months. (Nijland et al. 2010).

4.6 Evaluation of Upper Extremity

4.6.1 Action Research Arm Test (ARAT)

**Action Research Arm Test (ARAT)**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What does it measure?</td>
<td>Upper extremity function and dexterity (Hsueh et al. 2002).</td>
</tr>
<tr>
<td>What is the scale?</td>
<td>The ARAT consists of 19 items designed to assess four areas of function; grasp, rip, pinch, and gross movement. Each question is scored on an ordinal scale ranging from 0 (no movement) to 3 (normal performance of the task).</td>
</tr>
<tr>
<td>What are the key scores?</td>
<td>Scores range from 0 – 57, with lower scores indicating greater levels of impairment.</td>
</tr>
</tbody>
</table>
4.6.2 Box and Block Test

**Box and Block Test**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What does it measure?</strong></td>
<td>Performance based measure of gross manual dexterity.</td>
</tr>
<tr>
<td><strong>What is the scale?</strong></td>
<td>150 small wooden blocks are placed in one of two equal compartments of a partitioned rectangular box. Respondents are seated and instructed to move as many blocks as possible, one at a time, from one compartment to the other in 60 seconds.</td>
</tr>
<tr>
<td><strong>What are the key scores?</strong></td>
<td>The BBT is scored by counting the number of blocks that are carried over the partition from one compartment to the other during the one-minute trial period.</td>
</tr>
<tr>
<td><strong>What are its strengths?</strong></td>
<td>Quick and easy to administer.</td>
</tr>
<tr>
<td></td>
<td>The simplicity of the performance task and the seated administration position may make the test more accessible to a wider range of individuals.</td>
</tr>
<tr>
<td></td>
<td>Established age and gender-stratified norms increase the interpretability to the results.</td>
</tr>
<tr>
<td></td>
<td>Results may have utility as a prognostic indicator of physical health.</td>
</tr>
<tr>
<td><strong>What are its limitations?</strong></td>
<td>Noisy to administer and could be distracting to other patients.</td>
</tr>
</tbody>
</table>

4.6.3 Chedoke-McMaster Stroke Assessment Scale

**Chedoke-McMaster Stroke Assessment Scale**

<table>
<thead>
<tr>
<th>Questions</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What does it measure?</strong></td>
<td>The Chedoke-McMaster Stroke Assessment Scale (CMSA) is a 2-part assessment consisting of a physical impairment inventory and a disability inventory. The impairment inventory is intended to classify patients according to stage of motor recovery while the disability inventory assesses change in physical function.</td>
</tr>
<tr>
<td><strong>What is the scale?</strong></td>
<td>The <em>scale’s impairment inventory has 6 dimensions</em>: shoulder pain, postural control, arm movements, hand movements, leg movements, and foot movements. Each <em>dimension</em> (with the exception of ‘shoulder pain’) is rated on a <em>7-point scale</em> corresponding to Brunnstrom’s 7 stages of motor recovery. The <em>disability inventory consists of a gross motor index (10 items) and a walking index (5 items).</em> With the exception of a 2-minute walking test (which is scored as either 0 or 2), items are scored according to the <em>same 7-point scale</em> where 1 represents total assistance and 7 represents total independence.</td>
</tr>
</tbody>
</table>
What are the key scores?
The impairment inventory yields a total score out of 42 while the disability inventory yields a total score out of 100 (with 70 points from the gross motor index and 30 points from the walking index).

What are its strengths?
The use of Brunnstrom staging and FIM scoring increases the interpretability of the CMSA and may facilitate comparisons across groups of stroke patients. The CMSA is relatively comprehensive and has been well studied for reliability and validity.

What are its limitations?
Taking approximately 1 hour to complete, the length and complexity of the CMSA may make the scale less useful in clinical practice. As primarily a measure of motor impairment, the CMSA should really be accompanied by a measure of functional disability such as the BI or the FIM.

CMSA is based on the Brunnstrom stages of motor recovery.

7 Brunnstrom Stages of Motor Recovery

1. Flaccid paralysis. No reflexes.
3. Spasticity is marked. Synergistic movements may be elicited voluntarily.
5. Spasticity wanes. Can move out of synergies although synergies still present.
6. Coordination and movement patterns near normal. Trouble with more rapid complex movements.

Stages of Motor Recovery of the Chedoke McMaster Stroke Impairment Inventory (Gowland et al. 1993)

<table>
<thead>
<tr>
<th>Stages</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Flaccid paralysis is present. Phasic stretch reflexes are absent or hypoactive. Active movement cannot be elicited reflexively with a facilitatory stimulus or volitionally.</td>
</tr>
<tr>
<td>2</td>
<td>Spasticity is present and is felt as a resistance to passive movement. No voluntary movement is present but a facilitatory stimulus will elicit the limb synergies reflexively. These limb synergies consist of stereotypical flexor and extensor movements.</td>
</tr>
<tr>
<td>3</td>
<td>Spasticity is marked. The synergistic movements can be elicited voluntarily but are not obligatory.</td>
</tr>
<tr>
<td>4</td>
<td>Spasticity decreases. Synergy patterns can be reversed if movement takes place in the weaker synergy first. Movement combining antagonistic synergies can be performed when the prime movers are the strong components of the synergy.</td>
</tr>
<tr>
<td>5</td>
<td>Spasticity wanes, but is evident with rapid movement and at the extremes of range. Synergy patterns can be revised even if the movement takes place in the strongest synergy first. Movements that utilize the weak components of both synergies acting as prime movers can be performed.</td>
</tr>
<tr>
<td>6</td>
<td>Coordination and patterns of movement can be near normal. Spasticity as demonstrated by resistance to passive movement is no longer present. Abnormal patterns of movement with faulty timing emerge when rapid or complex actions are requested.</td>
</tr>
</tbody>
</table>
Normal. A “normal” variety of rapid, age appropriate complex movement patterns are possible with normal timing, coordination, strength and endurance. There is no evidence of functional impairment compared with the normal side. There is a “normal” sensory-perceptual motor system.

4.7 Rehabilitation Management of Upper Extremity

4.7.1 Principles of Rehabilitation Management of the Upper Extremity Post Stroke

1. Enhanced therapy-increased intensity
2. Task specific

4.7.2 Enhanced Therapy in Upper Extremity

- Variety of treatments, many non-specific, and number of outcome measures make general conclusion more difficult.
- Conflicting evidence enhanced therapies improve short-term upper extremity function; results may not be long lasting.

STUDY
- 123 stroke patients causing upper extremity impairment within 10 days randomized to enhanced upper extremity care within 10 days of stroke for 30 min/d x 5d/week x 6 weeks.
- No significant differences.

STUDY
- 103 patients admitted for inpatient rehab participated in a 4 week program of upper extremity therapy.
- Patients randomized to either the graded repetitive upper limb supplementary program (GRASP group, n=53) or the control group (education protocol, n=50).
- Primary outcome measure was the Chedoke Arm and Hand Activity (CAHAI). Assessment conducted before and after treatment and at 5 months post stroke.
- Secondary measures were used to evaluate grip strength and paretic upper extremity use of outside of therapy time.
- Subjects in the GRASP group showed greater improvement in upper limb function (CAHAI) compared to the control group (mean change score: 14.1 vs 7.9, p<0.001).
- The GRASP group maintained this significant gain at 5 months post stroke.
- Significant differences were also found in favor of the GRASP protocol for grip strength and paretic upper extremity use.
Role of Intensity of Therapy

- Post-stroke rehab increases motor reorganization while lack of rehab reduces it; more intensive motor training in animals further increases reorganization.
- Clinically greater therapy intensity improves outcomes; reported for PT, OT, aphasia therapy, treadmill training and U/E function in selected patients (i.e. CIMT).
- One exception is VECTORS trial (Dromerick et al. 2009); showed high intensity upper extremity CIMT (6 hrs/day) starting day 10 showed less improvement at 3 months than less intense treatment; Rationale uncertain – not a large trial.

Number of Repetitions in the Upper Extremity

- No study has systematically determined a critical threshold of rehab intensity needed to obtain a benefit (MacLellan et al 2011).
- Research involves thousands of repetitions – EXCITE trial involved 196 hours of therapy per patient.
- If threshold is not reached, there is less recovery of the affected arm; patient develop compensatory movements (Schweighofer et al 2009).
- Lang et al. (2007) found practice of task-specific, functional upper extremity movements occurred in only 51% of rehab sessions meant to address upper limb rehab. Average number of repetitions per session was only 32 Technology (video gaming, robotics) may be necessary to achieve the maximum number of reps (Saposnik et al. 2010).

4.7.3 Task-Specific Training

- Task-specific practice is required for motor learning to occur.
- Task-specific training vs. traditional stroke rehab yields long-lasting cortical reorganization of specific area involved.
- Task-specific sessions for as short as 15 minutes are also effective in inducing lasting cortical representation changes.
- Page et al. (2003) have noted intensity alone does not account for differences between traditional stroke and task-specific rehab.
- Task-specific, low-intensity regimens designed to improve use and function of affected limb have reported significant improvements (Smith et al. 1999; Whitall et al. 2000; Winstein and Rose 2001).

STUDY
Arya KN, Verma R, Garg RK, Sharma VP, Agarwal M, Aggarwal GG. Meaningful task specific training (MTST) for stroke rehabilitation: a randomized controlled trial.
Top Stroke Rehabil 2012; 19:193-211.
- 103 patients with a Brunnstrom stage of 2 for arm recovery, avg. 12 weeks post stroke randomized to a 4 week course of either task-specific training or standard training using Bobath NDT.
- Patients in both groups received 1 hour of therapy 5X/wk.
- Outcomes were assessed before and after treatment and at 8 weeks follow-up and included Fugl-Meyer assessment (FMA), Action Reaction Arm Test (ARAT), Graded Wolf Motor Function Test (GWMFT), and Motor Activity Log (MAL).
Repellent Task-Specific Techniques for Upper Extremity

- Many of the treatments reviewed were nonspecific in nature, not well described, and evaluated at different stages of recovery; sample sizes were small.
- Often multiple outcomes were assessed, some of which demonstrated a benefit, while others did not.
- Typically there were improvements in impairment but did not transfer to functional improvements (disability level).
- Conflicting evidence that repetitive task-specific training techniques improve measures of upper extremity function.

Interventions for Rehabilitation Management of the Upper Extremity Post-Stroke

4.7.4 Sensorimotor Training in Hemiparetic Upper Extremity

- Sensorimotor stimulation treatment included thermal stimulation, intermittent pneumatic compression, splinting, cortical stimulation, and sensory training programs.
- Interventions were tested in acute, subacute, and chronic stages of stroke.
- Conflicting evidence that sensorimotor training improves U/E function, compared to traditional techniques.

4.7.5 Mental Practice

- Mental imagery as a means to enhance performance was adapted from sports psychology.
- Involves rehearsing a specific task or series of tasks mentally.
- Page et al. (2001a, b, c, 2005, 2007) patients in mental practice group showed improved upper extremity function.
- Cochrane review (Barclay-Goddard et al, 2011) showed that based on results of 6 RCTS (119 participants), mental practice in combination with other treatment appear more effective in improving upper extremity function than did other treatment alone. (SMD=1.37, 95% CI 0.60 to 2.15, p<0.0001).
- Recommended as a treatment adjunct to other upper limb interventions and used as a precursor to constraint-induced therapy.

4.7.6 Orthosis in Hemiparetic Upper Extremity

**Upper Extremity Orthosis**

- Common orthosis used in hemiplegic upper extremity is the wrist-hand-orthosis/splints.
- Can be static/passive (volar, dorsal splints) or dynamic/active (eg. Saebo-Flex®).
**Aims in Applying Orthosis**

- reduction in spasticity
- reduction in pain
- improvement in functional outcome
- prevention of contracture
- prevention of edema
- Strong evidence that static hand splinting does not improve motor function or reduce contracture formation.

**STUDY**


- RCT on 39 subjects, recruited to participate in a 5 week, home-based exercise program which incorporates stretching of wrists and finger flexor stretches with reach and grasp activities in addition to conventional therapy.
- The experimental group wore either a volar or a dorsal splint, while the control group wore no splint.
- There was no significant difference in spasticity reduction and passive range of motion of the wrists between the intervention and control group.

**4.7.7 Constraint-Induced Movement Therapy (CIMT)**

- CIMT is designed to reduce functional deficits in the more affected upper extremity.
- The key features of CIMT are restraint of the unaffected hand/arm and increased practice/use of the affected hand/arm.
- CIMT is designed to overcome learned non-use by promoting cortical reorganization (Taub et al. 1999).
- Suitable candidates for CIMT are patients with at least 20 degrees active wrist extension and 10 degrees of active finger extension, with minimal sensory or cognitive deficits.
- CIMT can be described as either:
  a) Traditional CIMT: 2 week training program, with 6 hours of intensive upper-extremity training with restraint of the unaffected arm for at least 90% of waking hours.
  b) Modified CIMT: often refers to less intense than traditional CIMT, with variable intensity, time of constraint and duration of program.

**Evidence for CIMT Post-Stroke for the Upper Extremity**

- **Acute stage:** There is conflicting evidence of benefit of CIMT in comparison to traditional therapies in the acute stage of stroke.
- **Chronic stage:** There is strong evidence of benefit of CIMT in comparison to traditional therapies in the chronic stage of stroke.
STUDY

- 69 chronic stroke patients allocated to either CIMT (n=33) or conservative treatment (n=36).
- CIMT group received 6 hrs of daily affected-U/E training and restrained unaffected U/Es x 5 days/wk x 2 wks; control group bimanual NDT training without restrained U/E.
- ARA test, pinch strength of affected U/E significantly higher for CIMT vs control group.

STUDY

- 222 patients between 3-9 months post stroke received either CIMT (n=106) vs usual care (n=116).
- CIMT wore a mitt on less-affected hand while performing repetitive task practice and behavioural shaping with hemiplegic hand x 30 sessions.
- CIMT significantly improved in Wolf Motor Function Test (p<0.001), the Motor Activity Log (MAL) Amount of Use (p<0.001) and MAL Quality of Movement (p<0.001) and caregiver MAL.

STUDY

- Further results reported from EXCITE trial immediately following randomization (3 – 9 months) (n=106) were compared to those who received delayed treatment (15 to 21 months).
- Earlier CIMT showed significantly greater improvement compared with delayed work on Wolf Motor Function Tool and Motor Activity Log.
- Stroke Impact Scale Hand and Arm Activities domains scores were also significantly higher among subjects in the early group.
- Early and delayed group comparison of scores on these measures 24 month after enrolment showed no statistically significant differences between groups.

STUDY

- Three arm, single blinded, single center RCT.
- Stratified for severity, age, NIHSS, pretest ARAT, days from stroke onset.
- Objective: To examine whether CIMT is superior to an equivalent amount of traditional occupational therapy and whether CIMT treatment effects are dose dependent.
- Methods: 1853 stroke patients screened (acute stroke admissions).
- 52 patients eventually included in study.
4.7.8 EMG/Biofeedback in Hemiparetic Upper Extremity

- EMG biofeedback provides audio or visual feedback from external muscle electrodes.
- 11 RCTs were identified.
- There is strong evidence that EMG / Biofeedback therapy is not superior to other forms of treatment.

4.7.9 Functional Electrical Stimulation (FES) in Hemiparetic Upper Extremity

- FES has been studied by a number of RCTs.
- There is strong evidence that FES treatment improves upper extremity function in acute stroke (<6 months post onset) and chronic stroke (>6 months post onset).

**STUDY**


- 60 hemiparetic stroke patients, 2-4 weeks post stroke randomized to receive standard rehabilitation + electrical stimulation (ES) of wrist extensors for 30 min/day x 3X/week x 8 weeks (n=25) or to routine rehabilitation (n=23).
- Change in isometric strength of wrist extensors was significantly greater in the ES group, at 8 and 32 weeks (p=0.004 and p=0.014).
- Grasp and grip score on the Action Research Arm Test (ARAT) had increased significantly in the ES group at 8 weeks (p=0.013 and p=0.02).

**STUDY**


- 32 chronic stroke subjects participated in 30-, 60- or 120-minute sessions of repetitive task-specific practice (RTP) + FES using Bioness device every weekday for 8 weeks.
- 4th group participated in a 30 minute per weekday home exercise program.
Outcomes were evaluated using the upper extremity section of the Fugl-Meyer Assessment of Sensorimotor Impairment (FM), the Arm Motor Ability Test (AMAT), the Action Research Arm Test (ARAT), and Box and Block (B&B) 1 week before and 1 week after intervention. After intervention, subjects in 120 minute group were only ones to exhibit significant score increases on the FM (P=.0007), AMAT functional ability scale (P=.002), AMAT quality of movement scale (P=.0002, and ARAT (p=.02). They also exhibited largest changes in time to perform AMAT tasks (P=.15) and B&B score (P=.10) although did not reach significance.

4.7.10 Mirror Therapy

- Mirror therapy is a form of visual imagery in which a mirror is used to convey visual stimuli to the brain through observation of one’s unaffected body part as it carries out a set of movements.
- Mirror is placed in patient’s mid-saggital plane, reflecting movements of the non-paretic side as if it was the affected side.

STUDY
- Included 14 studies (RCTs and randomized cross-over trials) with a total of 567 participants comparing mirror therapy with any control intervention for patients with stroke.
- When compared to all interventions, mirror therapy may have a significant effect on motor function depending on the control intervention.
- Mirror therapy may improve ADLs, reduce pain and improve visual spatial neglect.
- Effects on motor function were stable at follow up.
- Positive impact of mirror therapy at least as an adjunct to normal rehabilitation post stroke.
4.7.11 Robotics in Rehabilitation of Upper Extremity Post-Stroke

- There is strong evidence that sensorimotor training with robotic devices improves upper extremity functional outcomes, and motor outcomes of the shoulder and elbow.
- There is strong evidence that robotic devices do not improve motor outcomes of the wrist and hand.

**STUDY**

- 127 patients with moderate-to-severe upper limb impairment > 6 months post stroke were randomly assigned to intensive robot-assisted therapy (n=49), intensive comparison therapy (n=50), or to usual care (n=28). Therapy consisted of 36x1 hour sessions over a period of 12 weeks.
- Primary outcome was Fugl-Meyer Assessment (FM) at 12 wks. Secondary outcomes were scores on Wolf Motor Function Test and Stroke Impact Scale. Secondary analyses assessed treatment effect at 36 weeks.
- At 12 weeks, subjects in robot-assisted group gained more FM points, compared to subjects in usual care group (1.11 vs 1.06, p=0.08).
- Subjects in intensive therapy group gained more FM points compared with subjects in robot-assist group (4.01 vs 3.87, p=0.92).
- No other treatment comparisons were significant at 12 weeks.

4.7.12 Virtual Reality in Stroke Rehabilitation

- There is strong evidence that virtual reality treatment can improve motor function in the chronic stage of stroke.
- Useful as an adjunct to other interventions as enable additional opportunities for increasing repetition, intensity and provide task-oriented training.
STUDY
• 22 patients within 2 months of stroke receiving standard rehab randomized to receive either 8 x 60 minute sessions with either the Nintendo Wii gaming system (VRWii) or recreational therapy.
• Primary feasibility outcome was total time receiving the intervention. Efficacy was evaluated using the Wolf Motor Function Test, Box and Block Test and Stroke Impact Scale at 4 weeks post intervention.
• Interventions were successfully delivered in 9/10 in VRWii group and 8/10 in RT group.
• Participants in VRWii group had significant improvement in mean motor function of 7 seconds (WMFT).
• No other significant differences noted.

STUDY
• Included 7 studies on virtual reality therapy which were primarily designed to detect improvement in motor function.
• Primary outcome results were statistically significant for arm function.
• (SMD 0.53, 95% CI: 0.25 to 0.81).
• Nevertheless evidence was insufficient to reach conclusions about the effect of virtual reality and interactive video gaming on grip strength or speed.

4.8 Botulinum Toxin in the Hemiplegic Upper Extremity
• Botulinum toxin- has been shown to reduce spasticity in the upper extremity.
• However, botulinum toxin has not been shown to necessarily improve function likely because underlying weakness more than spasticity results in the limitation of function.
• Modest improvements in the dressing, grooming and eating on the Barthel Index score have been reported following botulinum toxin injections.
4.8.1 Common Indications for Use of Botulinum Toxin - in the Spastic Upper Extremity

- Adducted/internally rotated shoulder (subscapularis/pectoralis major) to improve on adduction and internally rotated shoulder tightness/contracture and pain.
- Flexed elbow (brachioradialis/biceps/brachialis) to make ADLs and hygiene easier as well as improve cosmesis.
- Pronated forearm (pronator quadratus/pronator teres) to improve hand orientation.
- Flexed wrist (flexor carpi radialis/brevis/ulnaris/extrinsic finger flexors) to improve ADLs and reduce pain.
- Clenched fist (flexor digitorum profundus/sublimis) to improve hygiene.
- Thumb in palm deformity (adductor pollicis/flexor pollicis longus/thenar group) to improve thumb for key grasp.

**STUDY**
- A randomized double-blinded, placebo controlled, multicenter trial investigating the efficiency and safety of one-time injections of BTx-A in 126 subjects with increased flexor tone in the wrist and fingers after a stroke.
- Modified Ashworth Scale scores for the wrist and fingers were significantly different between groups (p<0.001) at 4, 6 and 12 weeks follow-up.

**STUDY**
- 15 stroke patients were randomized to receive a single BTx- type B injection in the elbow, wrist, finger and thumb or placebo.
- Significant improvement in Ashworth Scale scores were observed at the wrist at week 2 and at all joints at week 4.
- Improvements were not sustained.

- There is strong evidence that treatment with botulinum toxin either alone or in combination with therapy significantly decreases spasticity in the upper extremity in stroke survivors.
- However, it has not been clear that the improvements are sustained, nor is there strong evidence that they are associated with improved function and quality of life.
- Most recent meta-analysis showed moderate treatment effect for botulinum toxin A on function.
STUDY

- 16 RCTs were identified, 10 of which reported sufficient data for inclusion in the pooled analysis (n=1000).
- Overall BTX-A was associated with a moderate treatment effect (standardized mean difference = \( .564 \pm .094 \), 95% confidence interval = \( .352 - .721 \), \( P < .0001 \)).

### Figure 2. Forest Plot of Estimated Treatment Effect Sizes

<table>
<thead>
<tr>
<th>Study name</th>
<th>Outcome</th>
<th>Time point</th>
<th>Std diff in means</th>
<th>Standard error</th>
<th>Lower limit</th>
<th>Upper limit</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brasheer 2002</td>
<td>DAS</td>
<td>6 weeks</td>
<td>0.788</td>
<td>0.185</td>
<td>0.405</td>
<td>1.151</td>
<td>0.000</td>
</tr>
<tr>
<td>Kanovsky 2009</td>
<td>DAS</td>
<td>2 weeks</td>
<td>0.406</td>
<td>0.197</td>
<td>0.109</td>
<td>0.602</td>
<td>0.023</td>
</tr>
<tr>
<td>McCrory 2009</td>
<td>MURS</td>
<td>8 weeks</td>
<td>0.276</td>
<td>0.207</td>
<td>-0.127</td>
<td>0.690</td>
<td>0.179</td>
</tr>
<tr>
<td>Suputtithada 2005</td>
<td>ARAT</td>
<td>8 weeks</td>
<td>1.051</td>
<td>0.360</td>
<td>0.388</td>
<td>1.814</td>
<td>0.027</td>
</tr>
<tr>
<td>Guo 2006</td>
<td>BI</td>
<td>4 weeks</td>
<td>0.465</td>
<td>0.262</td>
<td>-0.029</td>
<td>0.966</td>
<td>0.064</td>
</tr>
<tr>
<td>Jahangir 2007</td>
<td>BI</td>
<td>4 weeks</td>
<td>0.245</td>
<td>0.270</td>
<td>-0.301</td>
<td>0.781</td>
<td>0.380</td>
</tr>
<tr>
<td>Mckayheer 2009</td>
<td>MRL</td>
<td>12 weeks</td>
<td>0.047</td>
<td>0.340</td>
<td>-0.033</td>
<td>1.017</td>
<td>0.999</td>
</tr>
<tr>
<td>Bhattacharyya 2000</td>
<td>Disability Scale</td>
<td>6 weeks</td>
<td>0.707</td>
<td>0.339</td>
<td>0.103</td>
<td>1.441</td>
<td>0.015</td>
</tr>
<tr>
<td>Kahi 2010 (low)</td>
<td>DAS</td>
<td>8 weeks</td>
<td>1.350</td>
<td>0.459</td>
<td>0.549</td>
<td>2.151</td>
<td>0.001</td>
</tr>
<tr>
<td>Kahi 2010 (high)</td>
<td>DAS</td>
<td>8 weeks</td>
<td>0.580</td>
<td>0.254</td>
<td>0.001</td>
<td>1.056</td>
<td>0.028</td>
</tr>
<tr>
<td>Shaw 2011</td>
<td>ARAT</td>
<td>6 weeks</td>
<td>0.181</td>
<td>0.149</td>
<td>-0.111</td>
<td>0.473</td>
<td>0.225</td>
</tr>
</tbody>
</table>

Favours placebo  Favours BT-A
References


