

Physiotherapy interventions evidence table – Exercise-based interventions

The following table provides a summary of level I or II evidence (according to the NHMRC evidence hierarchy) for physiotherapy-relevant interventions in RA published between January 2012 and June 2019. Interpreting the evidence can be complex. RAP-eL users should consider the following:

- There are no current studies investigating the effects of exercise programmes on early versus late rheumatoid arthritis.
- Further research is needed into the optimal content, format (individual vs. group; supervised vs. unsupervised; home vs. gym based), duration and frequency of exercise programmes.
- Further research is required to look at improving long term adherence to home exercise programmes.
- Improved reporting of adverse events is also needed in future studies. Given the systemic nature of RA and extra-articular consequences of RA (refer to [Module 4](#)) practitioners are advised to monitor articular and non-articular effects of exercise and refer to a medical practitioner where unexplained changes in exercise tolerance are observed. Any adverse effects and/or concerns regarding their cardiovascular status should be referred immediately to their medical team.
- It is important to note that many of the interventions studied are done so in isolation, so the evidence refers to the effect of the single intervention, and not the effect of a multimodal intervention.

Physiotherapy-related intervention(s)	Sources of evidence (see key below)				Results	Making sense of the evidence
Resistance exercise	RCT	SR	MA	CSR	<ul style="list-style-type: none"> • Resistance exercise significantly improves isokinetic, isometric and grip strength. • Resistance exercise improves disability (as measured by health assessment questionnaire/ HAQ). • Resistance exercise improves walking (as measured by 50 foot walking test). • Although not conclusive it appears there is a trend 	<ul style="list-style-type: none"> - Resistance exercise is recommended as a routine and effective component of an RA management programme. - It appears higher intensity resistance exercise is more effective. The decision to use high intensity exercise should be made based on clinical judgement of the patient’s functional capacity and musculoskeletal health.
			✓			
	Baillet et al Rheumatology 2012; 51(3); 519-527. [link]					
	RCT	SR	MA	CSR		
				✓		
	Hurkmans et al (2009) Dynamic exercise programs (aerobic capacity and/or muscle strength training) in					

patients with RA
[\[link\]](#)

RCT	SR	MA	CSR
		✓	

Rausch Osthoff AK et al (2018). Effects of exercise and physical activity promotion: meta-analysis informing the 2018 EULAR recommendations for physical activity in people with rheumatoid arthritis, spondyloarthritis and hip/knee osteoarthritis.
[\[link\]](#)

towards higher intensity programmes being more effective.

- Muscle strengthening exercises are effective in improving quadriceps muscle strength in people with RA

Balance (proprioceptive) exercise

RCT	SR	MA	CSR
			✓

Silva et al (2010) Balance training (proprioceptive training) for patients with rheumatoid arthritis
[\[link\]](#)

RCT	SR	MA	CSR
✓			

da Silva KN, et al (2013). Effectiveness of

- In the CSR, no studies were available testing a specific balance exercise programme in patients with RA. A combination of strengthening, endurance and dynamic/functional exercises were used in all studies analysed.
- A more recent RCT by da Silva showed that a 16-week neuromotor exercise programme had a statistically positive effect in neuromotor

- There is some limited evidence to support the use of specific balance or proprioceptive exercise in patients with RA
- The effects of lower limb muscle weakness on falls risk in patients with RA is unclear
- Patients with RA are at risk of falls and the associated co-morbidities of a fall
- Until further research is available, clinicians need to assess on a case by case basis whether to include balance/

sensorimotor training in patients with rheumatoid arthritis: a randomized controlled trial [\[link\]](#).

performance in 91 people with RA, evaluated with Berg Balance Scale, Tinetti's Test and Timed-Up-and-Go Test.

proprioceptive exercise into a patient's exercise programme.

Aerobic exercise

RCT	SR	MA	CSR
			✓

Hurkmans et al (2009) Dynamic exercise programs (aerobic and/or muscle strength training) in patients with RA [\[link\]](#)

RCT	SR	MA	CSR
		✓	

Rausch Osthoff AK et al (2018). Effects of exercise and physical activity promotion: meta-analysis informing the 2018 EULAR recommendations for physical activity in people with rheumatoid arthritis, spondyloarthritis and hip/knee osteoarthritis. [\[link\]](#)

Katz P, et al (2018). Physical activity to reduce fatigue in

- Aerobic exercise programmes (short and long term programmes, exercise min x 2 weekly for at least a 6 week programme at >55% maximum heart rate, performed under supervision) have a moderately positive effect on aerobic capacity in patients with RA
- No adverse effects (on pain or joint count) were found in the four studies included in the Cochrane review.
- Small improvements in pain and function may be seen but these may not be clinically significant.
- A walking based program, supported with pedometers (Katz et al) identified that intervention groups significantly decreased fatigue levels, as well as showing improvements in physical function and self-reported

- Aerobic exercise performed a minimum x 2 weekly appears to be a safe and effective inclusion to a RA exercise programme for improving aerobic capacity.
- Aerobic exercise should not be used as a single modality, but rather an adjunct to other modalities, to address pain and functional impairment related to RA. However, when prescribed alone, it may be effective in reducing fatigue (e.g. using a walking program with pedometer support)
- Aerobic exercise is recommended as routine practice when combined with strengthening exercise
- There are no reported safety benefits of aerobic exercise performed in water over land based aerobic exercise.

rheumatoid arthritis: A randomized controlled trial [\[link\]](#)

disease activity. In contrast, there was no significant change in fatigue, or in the secondary outcomes of physical function or disease activity in the control group which received education alone.

Hydrotherapy

RCT	SR	MA	CSR
	✓		

Al-Qubaeissy et al 2013
Musculoskeletal Care; 11(1): 3-18.
[\[link\]](#)

RCT	SR	MA	CSR
			✓

Verhagen et al 2015
Balneotherapy (or spa therapy) for RA
[\[link\]](#)

RCT	SR	MA	CSR
		✓	

Barker et al 2014 Arch Phys Med Rehabil; 95(9): 1776-1786.
[\[link\]](#)

- There is some evidence to support hydrotherapy in the short term
- Potential benefits including reducing pain and joint tenderness, improved mood, increased grip strength and improved patient satisfaction when compared with usual or no care ([Al-Qubaeissy, 2013](#)).
- The most recent Cochrane review ([Verhagen, 2015](#)) found insufficient evidence to support hydrotherapy (or other aquatic therapies) over other interventions in improving pain and disability e.g. land exercise, relaxation, cyclosporins.
- [Barker et al \(2014\)](#) also found moderate improvements in pain, QOL and physical function when compared to
 - Although some studies show hydrotherapy may improve pain, joint tenderness, mood, grip strength and patient satisfaction as well as reduce disability in patients with RA in the short term, the most recent Cochrane Review reports this evidence is inconclusive.
 - Evidence supporting longer term benefits is also inconclusive.
 - Based on current evidence deciding between land and aquatic-based exercise should be made based on patient preference, functional capacity, safety and access to facilities.

	RCT	SR	MA	CSR	
Tai Chi				✓	<p>no exercise but no significant benefits over land exercise.</p> <ul style="list-style-type: none"> • Ekelman et al (2014) found insufficient evidence to support of Tai Chi delivered by OT's for RA. • Tai Chi-based programmes had no statistically significant effect on disease activity, activities of daily living, tender and swollen joints and patient global overall rating. • Tai Chi is suggested not to exacerbate symptoms (Han et al, 2004) and has statistically significant benefits in improving ankle plantarflexion.
	<p>Han et al 2004 (3) Tai Chi for treating RA [link]</p>				
		✓			<ul style="list-style-type: none"> - There is no current evidence to support the use of Tai Chi in improving disease activity, QOL, pain or function in patients with RA. - There is no current reported evidence of adverse effects of Tai Chi for RA. - Some patients may find Tai Chi more enjoyable than traditional exercise programmes (Han et al, 2004). This may improve participation and enjoyment and therefore be a suitable mode of gentle, active joint mobilisation.
	<p>Ekelman et al (2014) Occup Ther Health Care; 28(4): 347-361. [link]</p>				
Yoga		✓			<ul style="list-style-type: none"> • Reviews found only one study of poor quality investigating yoga for RA (the remaining studies reviewed were for other MSK conditions e.g. LBP). • There was poor detail regarding the frequency, class setting, yoga dosage and the control group was unspecified in the RA study. • Although improvements in
	<p>Ward et al. Complement Ther Med 2014; 22(5); 909-919. [link]</p>				
		✓			<ul style="list-style-type: none"> - High heterogeneity is found in literature researching yoga for RA (and other MSK conditions) resulting in no clear evidence regarding dosage/most efficacious content. - Yoga may reduce pain in patients with RA, however, studies of higher methodological quality are required. - There is currently no evidence
	<p>Ward et al. Musculoskeletal Care 2013 Dec; 11(4):203-217.</p>				

[\[link\]](#)

pain after a 40 week yoga programme were cited, methodological quality was poor resulting in a lower level of evidence.

to show yoga as being more efficacious than other forms of exercise for patients with RA.

- Some patients may find yoga to be more enjoyable than other forms of land-based exercise and therefore yoga may be an appropriate selection for some patients, depending on their physical function.

Static cycling

RCT	SR	MA	CSR
✓			

Meeus et al Pain Practice 2015; 15(2): 98-106.

[\[link\]](#)

- Patients with RA have a similar response to healthy controls whereby temporal summation of pain (the cumulative effect of C-fibre nerve stimulation resulting in increased discharges from 2nd order neurones in the spinal cord experienced by humans as an increase in pain) reduced after submaximal exercise (<15 minutes exercise bike) ([Meeus et al, 2015](#)).

- Submaximal exercise (e.g. on an exercise bike) performed by people with RA can have similar effects on endogenous pain modulation to healthy controls and hence may be beneficial as a management strategy for pain in RA (in addition to improvements in cardiovascular fitness and strength)

Unsupervised gym based exercise vs. supervised non-gym based exercise in patients with early RA

RCT	SR	MA	CSR
✓			

Orlova et al J Jpn Soci Balneol Climatol Phys Med 2014; 77(5): 469-470.

[\[link\]](#)

- Both exercise types were more effective than a control (drug therapy) in improving:
 - Function
 - QOL, and
 - Muscle strength

- Consider recommending gym based exercise (strengthening and cardiovascular) particularly to patients < 40yrs (better compliance)
- Supervised or gym based exercise will improve function,

					<ul style="list-style-type: none"> • Compliance with supervised exercise at 6 months is better than that of unsupervised gym-based exercise (except for patients <40yrs with early RA). • Poor detail given in the study about the content of the specific exercise interventions. 	<p>QOL and muscle strength.</p>								
<p>Upper extremity functional exercise training in combination with self-management education</p>	<table border="1"> <tr> <td>RCT</td> <td>SR</td> <td>MA</td> <td>CSR</td> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table>	RCT	SR	MA	CSR	✓							<ul style="list-style-type: none"> • Manning et al (2014) investigated upper extremity functional exercise training integrated with self-management education delivered in a group format (compared to HEP alone). • They found significant improvements in upper limb function (DASH outcome measure) at 12 but not 36 weeks. • Improvements were also seen in hand function, grip strength, self-efficacy, joint count and pain. • Benefits were maintained at 36 weeks for pain and self-efficacy. 	<ul style="list-style-type: none"> - Including functional upper limb exercise (and education) to a HEP improves upper limb function and strength. - Improvements in pain and self-efficacy may be longer lasting than improvements in upper limb strength and function. - Refer to the study Manning et al (2014) for further detail about the content and delivery of self-management education and specific exercise examples.
RCT	SR	MA	CSR											
✓														
<p>Specific hand exercise</p>	<table border="1"> <tr> <td>RCT</td> <td>SR</td> <td>MA</td> <td>CSR</td> </tr> <tr> <td>✓</td> <td></td> <td></td> <td></td> </tr> </table>	RCT	SR	MA	CSR	✓							<ul style="list-style-type: none"> • A specific hand exercise programme in addition to 	<ul style="list-style-type: none"> - Moderate intensity patient-specific hand strengthening
RCT	SR	MA	CSR											
✓														

programme

Lamb et al Lancet 2015; 385(9966): 421-429.

[\[link\]](#)

RCT	SR	MA	CSR
✓			

Williams et al Health Technol Assess 2015; 19 (19): 1-222.

[\[link\]](#)

RCT	SR	MA	CSR
✓			

Cima et al Rheumatology International 2013; 33(3): 725-732.

[\[link\]](#)

RCT	SR	MA	CSR
✓			

Williamson et al BMJ Open 2017; 7(4): e013121.

[\[Link\]](#)

usual care produced significant but small (4.3 points) difference measured with the Michigan Hand Questionnaire

- No significant differences were seen in pain, medication or healthcare use between the groups ([Lamb et al, 2015](#))
- Twice weekly physiotherapy-guided hand strengthening exercise sessions (total 20 sessions) in addition to 3 x weekly home exercises resulted in significant improvements in grip strength, pinch strength and hand function.

and stretching home exercises (including setting patient-specific goals, and an exercise diary to improve compliance) can be used to improve hand function and strength at relatively low cost.

- Numbers of treatment sessions ranged from 6-20 (Physiotherapy/OT) to progress the resistance and repetitions of these exercises.
- See [Cima et al \(2013\)](#) for details of strengthening exercises including pictures of exercises given.
- At 2 yr follow-up ([Williamson et al 2017](#)), there was no difference between the intervention and control groups, although the exercise participants were significantly improved compared with baseline. The reduction in hand function at 2yrs, compared with previously time points coincided with a reduction in exercise adherence, suggesting that long-term adherence is needed to maintain function.

Flexibility exercises

- No effect on passive or active

- Flexibility exercises do not

(ROM and stretching exercises)

RCT	SR	MA	CSR
		✓	

Rausch Osthoff AK et al.
 Effects of exercise and physical activity promotion: meta-analysis informing the 2018 EULAR recommendations for physical activity in people with rheumatoid arthritis, spondyloarthritis and hip/knee osteoarthritis.
[\[link\]](#)

ROM was demonstrated in a meta-analysis of flexibility exercises (ROM, stretching exercises) combined with aerobic or strengthening exercises, compared with no exercise or usual care.

appear to be effective in patients with RA. Considering potential for joint instability, this mode of exercise may be unsuitable for a some patients with RA.

Key To Evidence Sources:

- Randomised Controlled Trial (RCT)
- Systematic Review (SR)
- Meta-Analysis (MA)
- Cochrane Systematic Review (CSR)

List of Table Abbreviations:

ADL's – Activities of Daily Living

DAS28 – Disease activity score calculator for Rheumatoid arthritis [[click here for link to PDF](#)]

DASH – “Disabilities of the Arm Shoulder and Hand” outcome measure

HAQ – Health Assessment Questionnaire

HEP – Home Exercise Programme

HRQ – Health Risk Questionnaire

JP – Joint Protection

LBP – Lower Back Pain

OA – Osteoarthritis

OT – Occupational Therapy

QOL – Quality Of Life

RA – Rheumatoid Arthritis

RCT – Randomised Controlled Trial

TENS – Transcutaneous Electrical Nerve Stimulation

US - Ultrasound

1st MTPJ – 1st Metatarsophalangeal Joint