



MONASH University

Aquatic physiotherapy in Parkinson's Disease: A systematic review

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Parkinson's disease (PD)

- Progressive neurological disorder
- Loss of dopaminergic cells in basal ganglia
- Affects around 80,000 Australians
- Common signs or symptoms: hypokinesia, rigidity, postural instability, tremor, flexed posture, festination and freezing

Aquatic physiotherapy

- Sometimes referred to as *hydrotherapy*
- Combines knowledge about human movement and the hydrostatic properties of water
- Wealth of research in people with LBP, post-THR or TKR, and post stroke
 - Little is known about efficacy in people with PD

What is Aquatic Physiotherapy?



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Different Aquatic Physiotherapy techniques

Bad Ragaz



Different Aquatic Physiotherapy techniques

Halliwick
Concept

TRC:
facilitation of flexors
hip stabilization

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Different Aquatic Physiotherapy techniques

Ai Chi



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Review aims

1

Determine the efficacy and feasibility of aquatic physiotherapy in people with PD

2

Summarise the commonly used outcome measures and elements of aquatic intervention

3

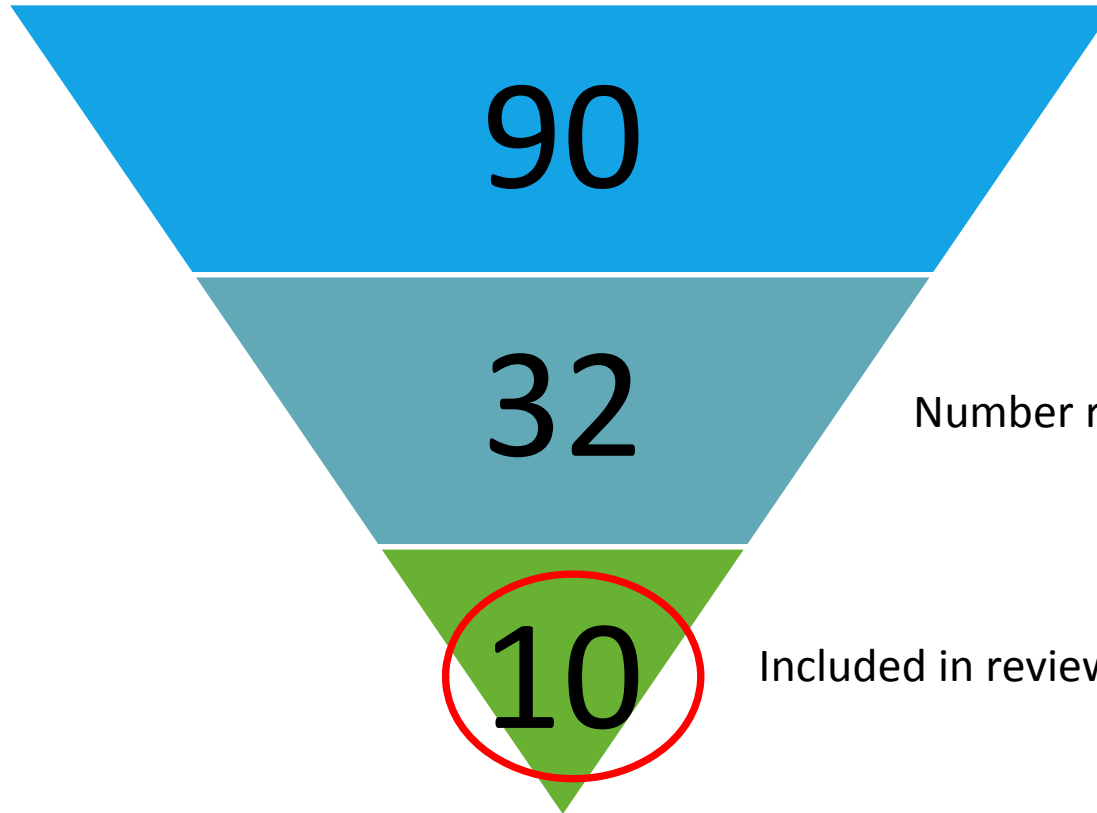
Examine the safety criteria reported when implementing aquatic interventions in people with PD

Selection Criteria

Inclusion criteria

1. All participants had idiopathic PD and not Parkinsonism disorders
2. Intervention included any form of physiotherapy prescribed exercise delivered in a heated pool
3. At least one outcome measure (impairment or activity limitation) was assessed pre- and post-treatment
4. Full papers published in English
5. Aquatic intervention was not combined with any other therapy i.e. land-based therapy

Search
yield



Total yield from
database + hand
search

Number read in full text

Included in review

Methodological characteristics of reviewed articles

Study ID	First named author, year	Study design	Population				Co-morbidities				Quality score
			n	Gender (number of males)	Mean age, year (SD)	mean disease duration, year (SD)	Mean Hoehn & Yahr stage (range)	Medications recorded	Falls Hx	Medical co-morbidities screen	
Ayan [18]	Cohort	I1: 10	4M	68.9 (9.6)	6.1 (3.1)	2.4 ± 0.7	Y	NR	NR	NR	8T
		I2: 10	5M	71.9 (5.1)	7.5 (5.5)	2.0 ± 0.7					
Ayan [20]	Cohort	I: 13	3M	65.3 (9.65)	5.8 (3.94)	1-3 NA	Y	NR	Y	NR	9.5T
		C: NA	NA	NA	NA	NA					
Da Silva [22]	Cohort	I: 13	6M	NR	NR	NR	Y	NR	Y	NR	5T
		C: NA	NA	NA	NA	NA					
Perez-de la Cruz [21]	Cohort	I: 15	6M	65.9 (7.1)	Stated >6 months	NR	Y	NR	Y	NR	8T
		C: NA	NA	NA	NA	NA					
Pompeu [23]	Cohort	I: 17	NR	67.6 (8.6)	NR	2.2 (1.0)	NR	NR	Y	Y	6T
		C: NA	NA	NA	NA	NA					
Sage [24]	Quasi experimental study	I: 12	12M	63.1 (9.2)	7.7 (6.4)	NR	Y	NR	NR	Y	7T
		C1: 17	9M	65.8 (9.9)	3.8 (3.9)	NR					
		C2: 18	9M	68.7 (8.3)	5.7 (4.0)	NR					
		C3: 24	18M	68.0 (4.5)	5.1 (4.5)	NR					
Villegas [25]	Cohort	I: 8	NR	67.5 (11.0)	8.0 (4.6)	2.8 ± 1.1	NR	NR	Y	Y	7.5T
		C: 7	NR	70.5 (9.6)	6.9 (2.5)	2.6 ± 1.8					
Vivas [17]	RCT	I: 6	3M	65.7 (3.7)	4.2 (1.6)	2.7 ± 0.6	Y	NR	NR	Y	6P
		C: 6	4M	68.3 (6.9)	7.8 (3.9)	2.4 ± 0.6					
Volpe [19]	RCT	I: 17	NR	68 (7)	7.5 (5.1)	2.8 ± 0.3	Y	Y	Y	Y	7P
		C: 17	NR	66.8 (8)	7.6 (4.6)	2.7 ± 0.5					
Zotz [26]	Cohort	I: 7	NR	59.9 (7.9)	7.9 (3.8)	2-3	Y	NR	NR	NR	4T
		C: NA	NA	NA	NA	NA					

C: comparison group; C1: aerobic group; C2: strength group; C3: SAFEx group; C4: control group; Cohort: cohort study; H&Y: Hoehn and Yahr; I: intervention group; I1: low intensity group; I2: muscular resistance group; NA: not applicable; NR: not reported; P: PEDro scale; Qualitative: qualitative study; RCT: randomised controlled trial; T: Twylerouid scale; Y: yes.

Aquatic intervention details

First named author (year)	Intervention specifics																	
	Impairments			Activity limitations				Treatment approaches				Other						
	Lower limb ^a	Upper limb ^a	Strength ^a	Aerobic ^a	Co-ord/Rhythm	Walking	Balance	Trunk mobility	Postural stability	Halliwick Concept	Bad Ragaz	Ai Chi	Group games	Relaxation/socialisation	Floating	Stretching	Warm up ^a	Cool Down ^a
Ayan [18]	I1:				✓	✓	✓						✓		✓	✓		
	I2:	✓	✓			✓	✓								✓	✓		
Ayan [20]					✓	✓	✓						✓		✓	✓		
Da Silva [22]		✓				✓	✓							✓	✓	✓		
Perez-de la Cruz [21]						✓	✓						✓	✓	✓	✓		
Pompeu [23]					✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		
Sage [24]			✓	✓			✓						✓		✓	✓		
Villegas [25]												✓						
Vivas [17]								✓	✓	✓							✓	
Volpe [19]							✓								✓		✓	✓
Zotz [26]										✓								

^aUnspecified; Bad Ragaz: an aquatic therapy method based on proprioceptive neuromuscular facilitation, Halliwick concept: A three stage, ten point program that teaches motor skills to encourage independence in the pool I1: Intervention 1-low intensity aquatic group, I2: intervention 2-muscular resistance aquatic group.

Intervention characteristics and outcome measures

Study ID First named author, year	Aquatic intervention				Adverse events	Outcome measures	Outcome		
	Time	Yes/no/reason Frequency (days/ week)	Intervention period				Pre	Post	Follow up
Ayan [18]	I1: 55 min I2: 60 min	2	12 weeks	No	→	UPDRS part 3 FTSTS test PDQ-39	✓ 2-3 days	✓ 2-3 days	
Ayan [20]	55 min	2	12 weeks	Yes- allergy to chlorine, n = 1	→	UPDRS parts 1-3			
Da Silva [22]	60 min	2	8 weeks	NR		FFT Barthel index PDQ-39 parts 1, 2 + 6	✓ 2-3 days	✓ 2-3 days	
Perez-de la Cruz [21]	45 min	2	10 weeks	No		PDQ-39 VAS Tinetti-gait, balance and total Get up and go test	✓	✓	✓ 4 weeks post
Pompeu [23]	40 min	3	12 weeks	NR	→	UPDRS DGI BBS TUG	✓	✓	
Sage [24]	60 min	3	12 weeks	NR	→	UPDRS	✓	✓	✓ 6 weeks post
Villegas [25]	35 min	2	12 weeks	NR	→	UPDRS Posture ^a PDQ-39	✓	✓	
Vivas [17]	45 min	2	4 weeks	NR	→	UPDRS Gait kinematics FRT BBS TUG	✓	✓	✓ 17 days post
Volpe [19]	60 min	5	8 weeks	No	→	UPDRS parts 2 and 3 BBS TUG COP sway area ABCS FES Falls diary PDQ-39	✓	✓	✓ 7 days post
Zotz [26]	30 min	2	5 weeks	NR		Halliwick concept	✓	✓	

✓Intervention assessment completed but timeframe unknown.

^aPosture assessed via Postural Assessment Software SAPO, ABCS: Activities-specific balance confidence scale, BBS: Berg balance scale, COP: Centre of pressure, DGI: Dynamic gait index, FES: Falls efficacy scale, FFT: Fullerton fitness test, FRT: Functional reach test, FTSTS test: five times sit to stand test, get up and go test: Timed with seconds, not ordinal scale therefore the same as the TUG test, Halliwick concept: a three stage, 10 point program that teaches motor skills to encourage independence in the pool, I1: low intensity aquatic group, I2: muscular resistance aquatic group, NR: not reported, PDQ-39: Parkinson's disease questionnaire, QOL: quality of life, TUG: timed up and go test, Tinetti: Tinetti gait and balance tool, UPDRS: unified Parkinson's disease rating scale, VAS: visual analogue scale.

Efficacy of aquatic interventions

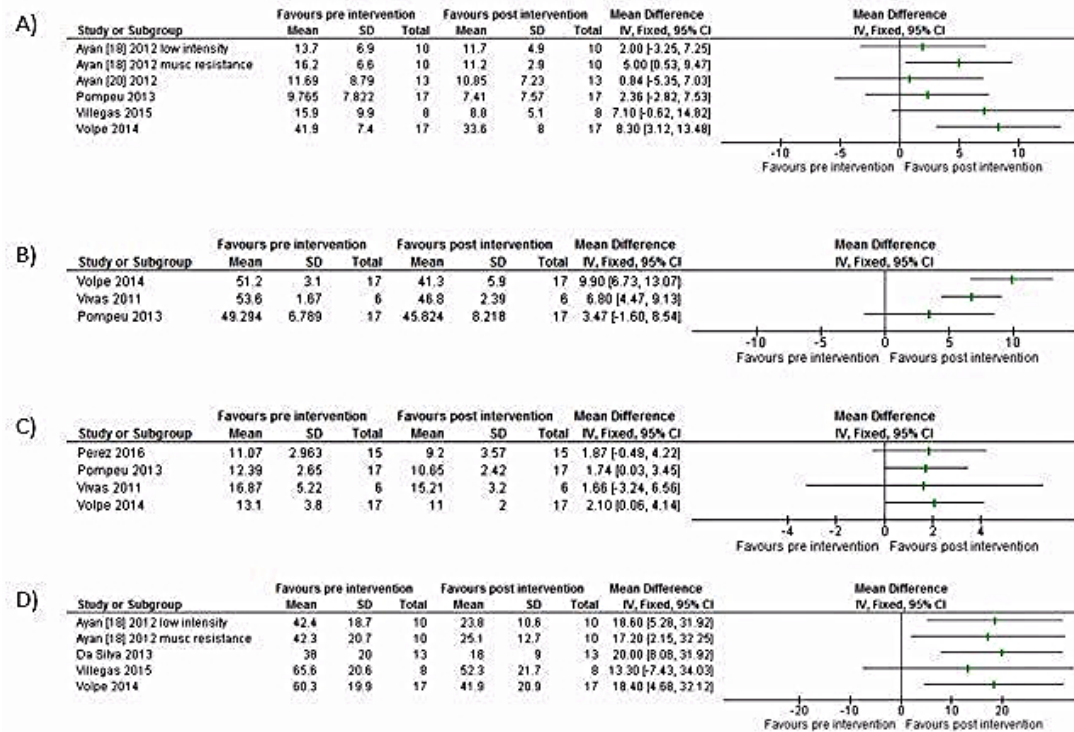


Figure 3. Forest plot illustrating within-group outcomes of interventions, with pre and post aquatic intervention comparisons according to first named author and year for A) UPDRS-III; B) Berg Balance Scale; C) Timed Up and Go; and D) Parkinson's Disease Questionnaire-39

Safety and feasibility

- Safety and feasibility data was poorly documented by all included studies
- Only four studies detailed safety data
 - How many instructors were present in and out of the pool, and expertise level
- Falls history was also under-reported by many studies in this review
 - High prevalence of falls amongst people with PD

Key findings

- No clear evidence regarding whether aquatic physiotherapy is a beneficial treatment modality for people with PD
- Low reporting of safety items around aquatic physiotherapy

Where to from here?

- Minimum data set to be developed to aid future meta-analysis
 - -UPDRS
 - -PDQ-39
 - -Falls History
- Further research required
 - ➔ Feasibility study currently underway effect of aquatic PT on falls and balance in PD clients

The efficacy and feasibility of aquatic physiotherapy for people with Parkinson's disease: a systematic review

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ABSTRACT

Purpose: To critically evaluate the literature regarding the efficacy and feasibility of aquatic physiotherapy in people with Parkinson's disease.

Method: Relevant studies were identified through searches in nine health-related databases. Two independent reviewers assessed study quality using either the PEDro scale or a customised tool for safety and feasibility.

Results: Database searches yielded 88 articles, of which 10 met the inclusion criteria. Studies varied greatly in methodology, quality, interventions and outcome measures. Study quality was generally low in items reporting on safety precautions, adverse events, attrition, and adherence. Results suggest that aquatic physiotherapy may have a positive effect on motor symptoms, quality of life and balance.

Conclusions: Aquatic physiotherapy may improve aspects of motor performance, quality of life and balance in people with Parkinson's disease, however, it remains unclear whether it is a safe and feasible treatment modality. The development of standardised outcome measures for people with Parkinson's disease (unified Parkinson's disease rating scale and Parkinson's disease questionnaire-39) would aid study comparability and validate study outcomes. As safety criteria was grossly underreported, guidelines for mandatory reporting of safety criteria are essential to make conclusions regarding the feasibility of aquatic physiotherapy for people with Parkinson's disease.

► IMPLICATIONS FOR REHABILITATION

- Aquatic physiotherapy may be a beneficial treatment modality for people with Parkinson's disease.
- A minimum data set that includes the unified Parkinson's disease rating scale and Parkinson's disease questionnaire 39 is required to aid future meta-analysis and to allow more definitive conclusions to be made regarding aquatic physiotherapy for people with Parkinson's disease.
- People with Parkinson's disease are a vulnerable population, where safety within an aquatic physiotherapy program needs to be well documented and addressed.

ARTICLE HISTORY

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KEYWORDS

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Questions?



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