

The efficacy of rehabilitation in dialysis patients

Citation	Yap G.& Melder A. 2017. The efficacy of rehabilitation in dialysis patients: A Literature Review. Centre for Clinical Effectiveness, Monash Innovation and Quality, Monash Health, Melbourne, Australia.
-----------------	--

Executive Summary

Background

Hemodialysis patients in residential aged care at Monash Health are required to travel to receive dialysis treatment for an extended period (i.e. hours) during the day. As a result, these patients may miss their scheduled rehabilitation sessions. In addition to this, the efficacy of rehabilitation for this subgroup of patients is currently unknown. The Director of Nursing/Operations Director of the Kingston Centre has requested a review of literature on the efficacy of rehabilitation in dialysis patients.

Objective

To determine the efficacy of rehabilitation in dialysis patients in improving patient quality of life and functional outcomes, increasing patient satisfaction, enhancing dialysis efficacy, and reducing depression.

Methodology

A search for systematic review/literature reviews published in English from 2012 to present was conducted in Ovid MEDLINE® database and the internet (Table 1). Documents were screened according to the eligibility inclusion criteria in Table 2. Included reviews were appraised for their quality according to four criteria (Appendix 1 Table 4).

Results

Twelve systematic reviews and meta-analyses were identified, therefore an *a posteriori* decision was made to only include and summarise reviews published from 2014 to 2017. As a result, five reviews that synthesised evidence of the efficacy of physical rehabilitation, particularly exercise, in improving patient outcomes in dialysis patients were included in this report. These included four high quality systematic reviews and/or meta-analyses [1-4] and one low quality literature review [5]. Two high quality studies reported the significant impact that intradialytic exercise has on improving outcomes in hemodialysis patients [1, 4].

All the studies included exercise programmes that were at least 30 minutes in length, performed 2-3 times a week, for at least 6-8 weeks in duration. The studies that reported intradialytic exercises mainly involved aerobic exercises (i.e. cycling), but in some cases, a mixture of aerobic and resistance exercises were reported [1, 4]. Examples of progressive resistance training may include weighted ankle cuffs and dumbbells, lower and/or upper limb exercises [3, 5].

Physical rehabilitation was reported to have a positive improvement in all outcomes (i.e., quality of life, functional outcomes, patient satisfaction, dialysis efficacy, and depression) except mental function/components of quality of life.

No synthesised evidence was identified that reported the effect of cognitive or social rehabilitation on improving quality of life, functional outcomes or reducing depression in dialysis patients; or any evidence that reported the effect of rehabilitation on patient satisfaction.

Conclusions

Physical rehabilitation has consistently resulted in improvements to patient quality of life, dialysis efficacy, functional outcomes and the reduction of depression in dialysis patients. No significant improvement in mental function/components have been reported.

The limited body of evidence shows that exercise prescription may include a combination of aerobic and progressive resistance exercises, performed twice or thrice a week, carried out for at least 6-8 weeks in duration. Each session lasts at least 30 minutes and is performed during or in between dialysis sessions. It should be noted that the evidence is based on a small number of RCT with varied exercise prescription protocols, therefore limiting any conclusions made on an optimal exercise rehabilitation regime.

Rapid Review – full report

The efficacy of rehabilitation in dialysis patients

Citation Yap G. & Melder A. 2017 The efficacy of rehabilitation in dialysis patients: A Literature Review. Centre for Clinical Effectiveness, Monash Innovation and Quality, Monash Health, Melbourne, Australia.

Background

Hemodialysis patients in residential aged care at Monash Health are required to travel to receive dialysis treatment for an extended period (i.e. hours) during the day. As a result, these patients may miss their scheduled rehabilitation sessions. In addition to this, the efficacy of rehabilitation for this subgroup of patients is currently unknown. The Director of Nursing/Operations Director of the Kingston Centre has requested a review of literature on the efficacy of rehabilitation in dialysis patients.

Objectives

To determine the efficacy of rehabilitation in dialysis patients in improving patient quality of life and functional outcomes, increasing patient satisfaction, enhancing dialysis efficacy, and reducing depression.

Definitions

For the purpose of the review, dialysis patients refer to hemodialysis patients, and rehabilitative methods will not be limited to physical rehabilitation (exercise), cognitive rehabilitation or social rehabilitation. Physical exercises may be classified as either intradialytic (performed during dialysis) or interdialytic (performed in between dialysis sessions).

Methods

A search for systematic review/literature reviews published in English from 2012 to present was conducted in Ovid MEDLINE® database and the internet (Table 1). Documents were screened according to the eligibility inclusion criteria in Table 2.

Table 1. Search terms

Search Terms in Ovid MEDLINE(R) 1946 to Present with Daily Update		Results
#	Terms	
1	*Renal Insufficiency, Chronic/ or *Renal Dialysis/ or *Kidney Failure, Chronic/ or Hemodialys*.mp. or *Aged/	142944
2	*Renal Dialysis/ or haemodialys*.mp.	64557
3	exp Rehabilitation/ or exp Aged/ or rehabilitat*.mp	3009147
4	*Rehabilitation/ or *Aged/	31431
5	exp Psychosocial Support Systems/ or psychosocial.mp.	70633
6	exp Exercise Therapy/ or physical rehab.mp. or exp Rehabilitation/	268155
7	exp Aged/px, rh, th [Psychology, Rehabilitation, Therapy]	8369
8	patient education.mp. or Patient Education as Topic/	90312
9	#1 or #2	146215
10	#3 or #4 or #5 or #6 or #7 or #8	3122165
11	#9 and #10	59916
12	Limit #11 to (English language and humans and yr "2012-current")	12094
13	Review.m_titl.	300354
14	#12 and #13	168
Search Terms in Google		Results
"rehabilitation in dialysis patients review" Limit to English, "2012....2017"		400

Table 2. Document eligibility criteria

Inclusion Criteria		
Setting	Inclusion	Hemodialysis (HD) patients Aged; older persons International
	Exclusion	Peritoneal dialysis patients only Pre-dialysis or non-dialysis chronic kidney patients
Intervention	Inclusion	All type of rehabilitation <ul style="list-style-type: none"> ○ Physical ○ Cognitive ○ Social
Outcomes	Inclusion	Patient outcomes <ul style="list-style-type: none"> ○ Quality of Life (QoL) ○ Depression ○ Patient satisfaction ○ Dialysis Efficacy ○ Functional outcomes
	Exclusion	Biochemical/physiological outcomes <ul style="list-style-type: none"> ○ Blood parameters i.e., hemoglobin, albumin levels ○ Blood pressure ○ Muscular parameters i.e. muscle strength, size ○ VO₂; levels of oxygen consumption
Document Details	Inclusion	Systematic reviews, literature reviews, meta-analysis, English language
	Exclusion	All other types of literature Non-English
Publication Date	Inclusion	2012 – 2017

Document selection

Publications were excluded if they did not distinguish between hemodialysis patients from other chronic kidney disease (CKD), transplant or peritoneal dialysis patients, or if authors did not conduct separate sub-group analyses on hemodialysis patients. The publications selected for this review did not limit ages of participants in their included studies, neither was sub-group analyses conducted for older participants. All 12 studies reported the effects of physical rehabilitation (exercise) in dialysis patients.

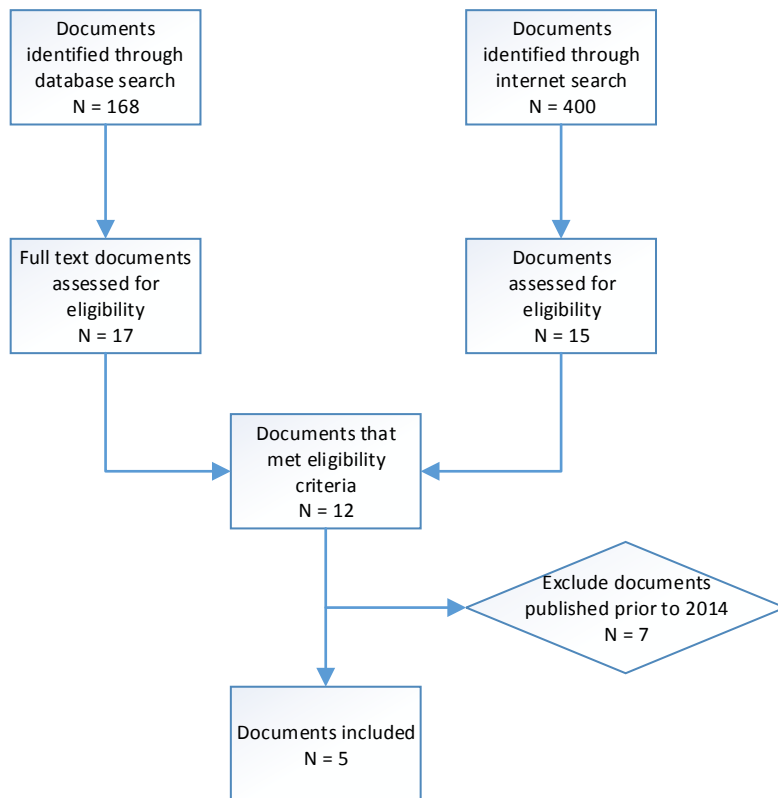
Quality Appraisal

Only included studies were appraised for their quality based on four criteria such as: 1) An appraisal of the quality of included studies was done; 2) Inclusion and exclusion criteria was detailed; 3) A clear search strategy detailing the search terms, and date limitations was included; 4) The review had a clear research question and aim. One point was given for each of the quality criteria met. Scores on the quality of included reviews are provided in Appendix 1 Table 4.

Results

The literature searches identified 12 reviews that met the inclusion criteria (Figure 1). Only five were included in this review.

Figure 1. Search results and screening process used in the review



Document selection

The database searches identified 168 documents.

The internet search identified 400 results.

When a screening decision could not be made based on title and abstract alone, the full text was retrieved.

Thirty-two full text documents were retrieved. One full text was not available.

A total of 12 documents met the eligibility criteria for inclusion.

Due to a large number of systematic reviews and meta-analysis identified, the author made an *a posteriori* decision to only include the most up to date information. Therefore, reviews published prior to 2014 were excluded from this review.

Five reviews were selected for this report (Figure 1).

Due to the large number of systematic reviews and meta-analyses identified, a decision was made *a posteriori* to include only the five reviews published from 2014 to 2017.

Description of results

Five reviews synthesised evidence of the efficacy of physical rehabilitation, particularly exercise, in improving patient outcomes in dialysis patients. These included four high quality systematic reviews and/or meta-analyses [1-4] and one low quality literature review [5]. Two high quality studies reported the significant impact that intradialytic exercise has on improving outcomes in hemodialysis patients [1, 4].

Collectively, both exercise prescription (i.e., type of exercises, exercise intensity, length of each session, duration of the programme, timing of each session – interdialytic or intradialytic) and patient outcomes varied in the reported literature. All the studies included exercise programmes that were at least 30 minutes in length, performed 2-3 times a week, for at least 6-8 weeks in duration. The studies that reported intradialytic exercises mainly involved aerobic exercises (i.e. cycling), but in some cases, a mixture of aerobic and resistance exercises were reported. [1, 4] Examples of progressive resistance training may include weighted ankle cuffs and dumbbells, lower and/or upper limb exercises [3, 5].

Patient outcomes

Physical rehabilitation was reported to have a positive improvement in all outcomes of interest, except mental function/components. Details of all results are summarised in Table 3. Significant improvements to patient quality of life (QoL) [1-3] and functional outcomes [2, 4, 5], while reductions in depression [1] were reported. The effect of physical rehabilitation on mental function/components showed no significant improvement [1, 4]. Sheng *et al.* (2014) was the only team to report a significant improvement on dialysis efficacy [4].

High quality evidence shows that physical rehabilitation performed either during or between dialysis sessions, significantly improves physical or functional components of quality of life in adult dialysis patients over 18 years [1, 3, 4]. Although the authors did not analyse results according to the different age groups of patients, the mean age of participants reported ranged from 43-69 years [3, 4].

There was no synthesised evidence that reported the effect of cognitive or social rehabilitation on improving quality of life, functional outcomes or reducing depression in dialysis patients; or any evidence that reported the effect of rehabilitation on patient satisfaction.

Other outcomes

Only Bessa *et al.* (2015) reported on adherence to the rehabilitation (exercise) programme [2], while only Cheema *et al.* (2014) reported no differences in adverse events between intervention and control groups undergoing intradialysis exercise programmes [3].

Table 3. Summary of results describing the effect of physical rehabilitation on quality of life, depression, patient satisfaction, dialysis efficacy, and functional outcomes

Reference	Type of publication	Quality of Evidence	Setting	Outcomes of interest	Comparator	Details of rehabilitation prescription		
						Type	*Length/Duration	Frequency
Chung Y-C <i>et al.</i> (2017)	Systematic review and meta-analysis	High quality	HD Patients (dialysis >3months)	<ul style="list-style-type: none"> ➤ Reduces depression (SMD = -0.80, 95% CI: -1.10 to -0.50) ➤ Improves physical component of QoL (SMD = 0.46, 95% CI: 0.20-0.73) ➤ No significant improvement to mental component of QoL 	No exercise	Intradialytic exercises	30min/8 weeks	3 x pw
Sah S.K. <i>et al.</i> (2015)	Review	Low quality	>40 years CKD patients undergoing dialysis	<ul style="list-style-type: none"> ➤ Four out of seven of the included studies report significant improvements in functional outcomes in patients in the intervention group ➤ Evidence suggests that Progressive Resistive Exercise (PRT) is effective among middle-aged patients with CKD ➤ Authors recommend PRT in the form of variable strengthening exercises to improve mobility and functional capacity of patients 	No exercise	PRT exercises	Varied/at least 8 weeks	Varied
Bessa B. <i>et al.</i> (2015)	Review	High quality	HD Patients with CKD	<ul style="list-style-type: none"> ➤ Three out of 21 included studies report improvements in QoL ➤ Six out of 21 included studies show improvements in physical capacity 	Exercise controls (0-6 week)	Resistance training	At least 30 min/at least 6 weeks	2-3 x pw
Cheema B.S. <i>et al.</i> (2014)	Systematic review and meta-analysis	High quality	ESRD Patients	<ul style="list-style-type: none"> ➤ PRT significantly improves health-related QoL [SMD = 0.83 (95 % CI: 0.51–1.16), p <0.001] 	Non-treatment or placebo	PRT exercises	Not reported /at least 6 weeks	2-3 x pw

Sheng K. <i>et al.</i> (2014)	Systematic review and meta-analysis	High quality	HD Patients	<ul style="list-style-type: none"> ➤ PRT had positive impact on dialysis efficacy [SMD = 0.27 (95% CI: 0.01 – 0.53, p = 0.04) (I² = 0%, p = 0.548)] ➤ Intradialytic exercise had significant positive effects on the physical function of life [SMD = 0.30 (95% CI: 0.05 – 0.55); p = 0.02 (I² = 39.5%, p = 0.128)] but not on mental function [SMD = 0.14 (95% CI –0.16 to 0.43, p = 0.37) (I² = 14.8%, p = 0.32)] 	Controls	Intradialytic exercise	Not reported/at least 8 weeks	2-3 x pw
-------------------------------	-------------------------------------	--------------	-------------	--	----------	------------------------	-------------------------------	----------

Key: PRT – Progressive Resistance or Resistive Exercise; pw – per week; HD – Hemodialysis; QoL – Quality of life; CKD – Chronic kidney disease; Intradialytic exercise (physical training performed during hemodialysis); ESRD – End-stage renal disease

**Length refers to the length of each exercise session, and duration refers to the duration of the whole exercise programme.*

Limitations

It is worthwhile noting that the evidence was limited to small numbers of eligible RCT included in the meta-analyses included in this review [1, 3, 4]. Also, heterogeneity in exercise prescription protocols (with regards to intensity, duration, modalities) make it difficult to draw conclusions on an optimal rehabilitation programme regime [1, 2, 4, 5]. The strict eligibility criteria to participate in clinical trials suggests that healthier patients are more often recruited [1, 5].

Conclusions

Physical rehabilitation (prescription of exercise) has consistently resulted in improvements to patient quality of life, dialysis efficacy, functional outcomes and the reduction of depression in dialysis patients. No significant improvement in mental function/components have been reported.

A limited body of evidence shows that exercise prescription may include a combination of aerobic and progressive resistance exercises, performed twice or thrice a week, carried out for at least 6-8 weeks in duration. Each session lasts at least 30 minutes and is performed during or in between dialysis sessions. Intradialytic exercises i.e. performed during dialysis, mainly consist of aerobic exercises such as cycling, but may also include resistance training (weighted exercises). It should be noted that the evidence is based on a small number of RCT with varied exercise prescription protocols, therefore limiting any conclusions made on an optimal exercise rehabilitation regime.

The authors did not identify evidence that reported the effect of cognitive or social rehabilitation on improving quality of life, functional outcomes or reducing depression in dialysis patients; or any evidence that reported the effect of rehabilitation on patient satisfaction.

References

1. Chung, Y.-C., M.-L. Yeh, and Y.-M. Liu, *Effects of intradialytic exercise on the physical function, depression and quality of life for haemodialysis patients: a systematic review and meta-analysis of randomised controlled trials*. Journal of clinical nursing, 2017.
2. Bessa, B., et al., *Resistance training in hemodialysis patients: a review*. Rehabilitation nursing : the official journal of the Association of Rehabilitation Nurses, 2015. **40**(2): p. 111-26.
3. Cheema, B.S., et al., *Effect of progressive resistance training on measures of skeletal muscle hypertrophy, muscular strength and health-related quality of life in patients with chronic kidney disease: a systematic review and meta-analysis*. Sports medicine (Auckland, N.Z.), 2014. **44**(8): p. 1125-38.
4. Sheng, K., et al., *Intradialytic exercise in hemodialysis patients: a systematic review and meta-analysis*. American journal of nephrology, 2014. **40**(5): p. 478-90.
5. Sah, S.K., M.A. Siddiqui, and H. Darain, *Effect of Progressive Resistive Exercise Training in Improving Mobility and Functional Ability of Middle Adulthood Patients with Chronic Kidney Disease*. Saudi J Kidney Dis Transpl, 2015. **26**(5): p. 912-923.

Excluded references

6. Rasheeda K. Hall, End-Stage Renal Disease in Nursing Homes: A Systematic Review. J Am Med Dir Assoc. 2013 April ;14(4): 242–247.
7. K Girija, R.Radha. Beneficial Effect of Physical Activity in Hemodialysis Patients. Universal Journal of Engineering Science 2013; 1(2): 40-44.
8. Dorian M. Zelle. Physical inactivity: a risk factor and target for intervention in renal care. Nature reviews nephrology March 2017; 13 : 152-168
9. Farragher J. and Jassal, S.V. Rehabilitation of the Geriatric Dialysis Patient. Seminars in Dialysis. 2012; 25, No 6 (November–December): 649–656.
10. Heiwe, S. Jacobson S.H. Exercise Training in Adults With CKD: A Systematic Review and Meta-analysis. Am J Kidney Dis. 2014; 64(3):383-393.
11. Howden E.J, et al. Exercise Training in Chronic Kidney Disease Patients. Sports Med 2012; 42 (6): 473-488
12. Koufaki P. et al. Exercise Therapy in Individuals With Chronic Kidney Disease. Annual review of nursing research. 2013; 31:235-275.
13. Mitrou G, et al. Exercise Training and Depression in ESRD: A Review. Seminars in Dialysis. 2013; 26 (5): 604–613.

Appendix 1

Table 4. The quality of the five reviews was appraised using the four criteria below. The sum of the score received for each criterion determined the quality of the review. (Score: 1 or 2 – Low quality; 3 – Moderate quality; 4 – High quality)

	Chung et al. (2017)	Sah et al. (2015)	Bessa et al. (2015)	Cheema et al. (2014)	Sheng et al. (2014)
Criteria for appraisal	-	-	-	-	-
Clear question/aim	1	0	1	1	1
Detailed search strategy	1	0	1	1	1
Inclusion/exclusion criteria	1	1	1	1	1
Appraisal of Quality of included studies	1	1	1	1	1
Total Score	4	2	4	4	4
Quality of review	High	Low	High	High	High