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Supplementary Table S1 The detailed search strategy

Databases	#	Search strategy
Pubmed	1	"renal insufficiency, chronic"[MeSH Terms]
	2	"chronic renal insufficiency"[Title/Abstract] or "chronic kidney insufficiency"[Title/Abstract] or "chronic kidney disease"[Title/Abstract] or "chronic renal disease"[Title/Abstract]
	3	"CKD"[Title/Abstract] or "CKF"[Title/Abstract] or "CRD"[Title/Abstract] or "CRF"[Title/Abstract]
	4	"end-stage kidney"[Title/Abstract] or "end-stage renal"[Title/Abstract] or "endstage kidney"[Title/Abstract] or "endstage renal"[Title/Abstract]
	5	"ESRD"[Title/Abstract] or "ESRF"[Title/Abstract] or "ESKD"[Title/Abstract] or "ESKF"[Title/Abstract]
	6	"Renal Replacement Therapy"[MeSH Terms]
	7	"dialysis"[Title/Abstract]
	8	"hemodialysis"[Title/Abstract] or "haemodialysis"[Title/Abstract] or "hemodiafiltration"[Title/Abstract] or "haemodiafiltration"[Title/Abstract] or "HD"[Title/Abstract]
	9	"PD"[Title/Abstract]
	10	"renal transplantation"[Title/Abstract] or "kidney grafting"[Title/Abstract] or "kidney transplantation"[Title/Abstract]
	11	"KTRs"[Title/Abstract]
	12	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11
	13	"Exercise"[MeSH Terms]
	14	"Exercise Movement Techniques"[MeSH Terms]
	15	"Exercise Therapy"[MeSH Terms]
	16	"Sports"[MeSH Terms]
	17	"train"[Title/Abstract] or "physical activity"[Title/Abstract] or "exercise"[Title/Abstract]
	18	#13 or #14 or #15 or #16 or #17
	19	"Systematic Review"[Publication Type] or "Systematic Reviews as Topic"[MeSH Terms]
	20	"meta analysis"[Publication Type] or "Meta-Analysis as Topic"[MeSH Terms]

	21	"Systematic Review"[Title/Abstract] or "system review"[Title/Abstract] or "data pooling"[Title/Abstract] or "meta"[Title/Abstract]
	22	#19 or #20 or #21
	23	#12 and #18 and #22
CDSR	1	MeSH descriptor: [Kidney Diseases] explode all trees
	2	("chronic kidney disease") or ("chronic renal disease") or ("chronic kidney failure") or ("chronic renal failure"):ti,ab,kw
	3	(CKF or CKD or CRF or CRD):ti,ab,kw
	4	("end-stage kidney") or ("end-stage renal") or ("endstage kidney") or ("endstage renal"):ti,ab,kw
	5	ESRD or ESRF or ESKD or ESKF:ti,ab,kw
	6	MeSH descriptor: [Renal Replacement Therapy] explode all trees
	7	dialysis:ti,ab,kw
	8	(hemodialysis or haemodialysis or hemodiafiltration or haemodiafiltration or HD):ti,ab,kw
	9	PD:ti,ab,kw
	10	("renal transplantation") or ("kidney grafting") or ("kidney transplantation"):ti,ab,kw
	11	KTRs:ti,ab,kw
	12	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11
	13	MeSH descriptor: [Exercise] explode all trees
	14	MeSH descriptor: [Exercise Movement Techniques] explode all trees
	15	MeSH descriptor: [Exercise Therapy] explode all trees
	16	MeSH descriptor: [Sports] explode all trees
	17	(train or ("physical activity") or exercise):ti,ab,kw
	18	#13 or #14 or #15 or #16 or #17
	19	MeSH descriptor: [Meta-Analysis as Topic] explode all trees
	20	MeSH descriptor: [Systematic Reviews as Topic] explode all trees
	21	("systematic review") or ("system review") or ("data pooling") or (meta):ti,ab,kw
	22	#19 or #20 or #21

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	23	#12 and #18 and #22
Embase	1	'kidney disease'/exp
	2	('chronic kidney disease' or 'chronic renal disease' or 'chronic kidney failure' or 'chronic renal failure'):ti,ab,kw
	3	(CKF or CKD or CRFor CRD):ti,ab,kw
	4	('end-stage kidney' or 'end-stage renal' or 'endstage kidney' or 'endstage renal'):ti,ab,kw
	5	(ESRD or ESRF or ESKD or ESKF):ti,ab,kw
	6	'renal replacement therapy'/exp
	7	'dialysis':ti,ab,kw
	8	(hemodialysis or haemodialysis or hemofiltration or haemofiltration or hemodiafiltration or haemodiafiltration or HD):ti,ab,kw
	9	PD:ti,ab,kw
	10	('renal transplantation' or 'kidney grafting' or 'kidney transplantation'):ti,ab,kw
	11	KTRs:ti,ab,kw
	12	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11
	13	'exercise'/exp
	14	'physical activity'/exp
	15	'sport'/exp
	16	(train or 'physical activity' or exercise):ti,ab,kw
	17	#13 or #14 or #15 or #16
	18	'systematic review (topic)'/exp or 'systematic review'/exp
	19	'meta analysis (topic)'/exp or 'meta analysis'/exp
	20	('systematic review' or 'system review' or 'data pooling' or meta):ti,ab,kw
	21	#18 or #19 or #20
	22	#12 and #17 and #21
Web of Science	1	TS: ("chronic kidney disease" or "chronic renal disease" or "chronic kidney failure" or "chronic renal failure" or CKD or CRD or CKF or CRF)

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2	TS: ("end-stage kidney" or "end-stage renal" or "endstage kidney" or "endstage renal" or ESKD or ESKF or ESRD or ESRF)
3	TS: ("renal replacement therapy" or dialysis or hemodialysis or haemodialysis or hemofiltration or haemofiltration or hemodiafiltration or haemodiafiltration or HD or PD)
4	TS: ("renal transplantation" or "kidney grafting" or "kidney transplantation" or KTRs)
5	#1 or #2 or #3 or #4
6	TS: (train or exercise or "physical activity")
7	TS: ("systematic review" or "system review" or "data pooling" or meta)
8	#1 and #2 and #3 and #4 and #5

Supplementary Table S2 The characteristic of excluded studies

Studies	Reasons for exclusion
Nantakool et al (2020)	Non predefine outcome
Sawant et al (2014)	Non predefine outcome
Smart et al (2014)	Duplicate literature
Barcellos et al (2015)	Meta-analysis was not conducted
Yang et al (2020)	Non predefine outcome
Young et al (2018)	Included cases<100
Phan et al (2015)	Duplicate literature
Molsted et al (2019)	Included cases<100
Segura et al (2010)	Non-English
Ferreira et al (2020)	Non predefine outcome
Koufaki et al (2013)	Meta-analysis was not conducted
Smart et al (2012)	Abstracts
Howden et al (2012)	Meta-analysis was not conducted
Calella et al (2019)	Meta-analysis was not conducted
Singh et al (2005)	Meta-analysis was not conducted
Cardoso et al (2020)	Non predefine outcome
Villanego et al (2020)	Non-English
Medeiros et al (2017)	Intervention did not fit
Macdonald et al (2009)	Meta-analysis was not conducted
Wen et al (2019)	Non predefine outcome
Yang et al (2015)	Non predefine outcome
Thangarasa et al (2018)	Included cases<100
Chan et al (2016)	Meta-analysis was not conducted

Johansen et al (2010)	Intervention did not fit
Thompson et al (2020)	Correction for published paper
Bakaloudi et al (2020)	Meta-analysis was not conducted
Kirkman et al (2019)	Meta-analysis was not conducted
Afsar et al (2018)	Meta-analysis was not conducted

Supplementary Table S3 The basic characteristics of the included meta-analyses

Author (year)	Design	Stage of CKD	k (n)*	Exercise type	Mode	Outcomes	SMD or MD(95% CI)	Effect size	P	I^2	GRADE
Pei (2019)	RCT/quasi-RCT	Mixed	17(464)	AE	-	VO$_{2peak}$	MD:2.08 (1.1,3.05)	-	<0.001	25.0%	Low
			5 (445)			STS 60	MD:2.08 (1.1,3.05)	-	0.98	82.0%	Very low
			8 (496)			6MWT	MD:0.04 (−0.52, 0.59)	-	0.9	86.0%	Very low
			12(514)			SBP	MD:−2.91 (−6.68, 0.87)	-	0.13	40.0%	Low
			12(514)			DBP	MD:−1.11 (−3.41, 1.20)	-	0.35	0.0%	Low
			6(522)			Physical function (SF-36)	MD:8.36(-1.24,17.95)	-	0.09	76.0%	Very low
			7(562)			Physical role (SF-36)	MD:14.65(1.47,27.84)	-	0.03	78.0%	Very low
			6(447)			Social function (SF-36)	MD:8.24(-1.09,17.58)	-	0.08	85.0%	Very low
			6(513)			Pain (SF-36)	MD:5.94(1.65,10.23)	-	0.007	49.0%	Very low
			7(562)			General health (SF-36)	MD:8.90(2.48,15.32)	-	0.007	71.0%	Very low
			6(542)			Mental health (SF-36)	MD:7.30(-0.94,15.54)	-	0.08	84.0%	Very low
Ferreira (2019)	RCT/quasi-RCT	HD	10(346)	AE	Intradialytic	Kt/V	SMD:2.21(1.17,3.25)	Large	<0.001	92.0%	Very low
Cheema (2014)	RCT	Predialysis	7(249)	RT	-	Muscle Strength	SMD:1.15（0.80-1.49）	Large	0.161	35.0%	Low
			6(223)			HRQoL	SMD:0.83(0.51-1.16)	Large	0.226	27.8%	Low
Wu (2020)	RCT/quasi-RCT	Predialysis	3(204)	AE+RT	-	SBP	SMD:-0.19(-0.46,0.08)	Small	0.16	50.0%	Very low
			4(194)			DBP	SMD:-0.47(-1.10,0.15)	Small	0.14	70.0%	Very low

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Nakamura (2020)	RCT/cross-over	Predialysis	10(401)	Mixed	-	VO$_{2peak}$	SMD:0.88(0.53,1.23)	Large	<0.001	56.0%	Low
			4(119)			Muscle Strength	SMD:0.35(-0.03,0.73)	Small	0.07	7.0%	Very low
			5(392)			6MWT	SMD:1.04(0.17,1.90)	Large	0.02	92.0%	Very low
			3(170)			TUGT	SMD:-0.42(-0.73,-0.11)	Small	0.007	0.0%	Very low
Lu (2019)	RCT	Dialysis	11(300)	Mixed	Mixed	6MWT	MD:67.6(49.93,85.26)	-	<0.001	30.6%	Moderate
			3(193)			STS 10	MD:-4.69(-9.01,-0.38)	-	0.028	72.2%	Very low
			5(234)			HGS	MD:5.35(3.34,7.37)	-	<0.001	0.3%	Low
			7(224)			Muscle strength	MD:3.67(1.37,5.97)	-	0.020	38.6%	Low
			6(240)			STS 30	MD:2.43(0.91,3.96)	-	0.002	21.2%	Low
Chen (2019)	RCT	KTRs	5(198)	Mixed	-	SBP	SMD:0.18(-0.10,0.46)	Small	0.21	0.0%	Very low
			5(198)			DBP	SMD:0.04(-0.45,0.52)	Small	0.89	59.0%	Very low
			4(166)			BMI	SMD:0.02(-0.28,0.33)	Small	0.89	0.0%	Very low
			6(202)			VO$_{2peak}$	SMD:0.33(-0.02,0.69)	Small	0.06	27.0%	Very low
Song (2018)	RCT	HD	4(141)	Mixed	Mixed	RLS	SMD:-1.79(-2.21,-1.37)	Large	<0.001	87.0%	Very low
			3(139)			Fatigue	SMD:-0.85(-1.20,-0.50)	Large	<0.001	0.0%	Very low
Salhab (2019)	RCT	HD	5(282)	AE	Intradialytic	PCS	SMD:1.82(-0.92,4.55)	Large	0.19	98.0%	Very low
			5(282)			MCS	SMD:1.02(0.31,1.73)	Large	0.005	75.0%	Very low
Andrade (2019)	RCT	HD	5(201)	AE+RT	Intradialytic	VO$_{2peak}$	SMD:1.01(0.71,1.30)	Large	<0.001	0.0%	Low
Chung (2016)	RCT	HD	4(127)	Mixed	Intradialytic	6MWT	SMD:0.44(0.09,0.80)	Small	0.015	0.0%	Low
			6(238)			VO$_{2peak}$	SMD:0.55(0.18,0.92)	Moderate	0.003	52.9%	Very low
			6(229)			PCS	SMD:0.46(0.20,0.73)	Small	<0.001	1.90%	Low
			5(193)			MCS	SMD:0.23(-0.05,0.52)	Small	0.109	0.0%	Low
Zhang (2021)	RCT	HD	8(299)	RT	Intradialytic	6MWT	SMD:0.52(0.28,0.75)	Moderate	<0.001	18.7%	Very low
			5(164)			STS 30	SMD:0.42(0.11,0.74)	Small	0.008	0.0%	Very low

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			6(300)			HGS	SMD:0.35(0.12,0.58)	Small	0.003	41.6%	Very low
			7(297)			PCS	SMD:0.23(-0.00,0.46)	Small	0.055	0.0%	Very low
			7(297)			MCS	SMD:0.13(-0.10,0.36)	Small	0.082	46.5%	Very low
Pu (2019)	RCT	HD	10(301)	Mixed	Intradialytic	Kt/V	SMD:0.29(0.06,0.52)	Small	0.01	0.0%	Very low
			10(400)			VO_{2peak}	SMD:0.57(0.23,0.90)	Moderate	<0.001	59.0%	Low
			7(219)			6MWT	SMD:0.57(0.30,0.84)	Moderate	<0.001	0.0%	Low
			10(320)			PCS	SMD:0.57(0.14,1.01)	Moderate	0.01	70.0%	Very low
			8(219)			MCS	SMD:0.19(-0.09,0.46)	Small	0.18	30.0%	Low
			7(287)			SBP	SMD:-0.28(-0.52,-0.05)	Small	0.02	0.0%	Very low
			7(287)			DBP	SMD:-0.32(-0.55,-0.08)	Small	0.008	42.0%	Very low
Yamamoto (2021)	RCT	Predialysis	10(392)	AE	-	SBP	SMD:-0.75(-1.24,-0.26)	Moderate	0.003	80.3%	Very low
			10(365)			VO_{2peak}	SMD:0.54(0.29,0.78)	Moderate	<0.001	24.6%	Very low
			10(414)			BMI	SMD:-0.19(-0.38,-0.00)	Small	0.026	0.0%	Low
Thompson (2019)	RCT	Predialysis	10(335)	Mixed	-	SBP	MD:-4.3(-9.0,0.4)	-	N.P.	50.4%	Very low
			8(303)			DBP	MD:-1.18(-4.76,2.40)	-	N.P.	60.5%	Very low
Yang (2017)	RCT	Mixed	4(150)	Mixed	-	VO_{2peak}	SMD:0.33(0.03,0.63)	Small	0.003	47.0%	Low
Clarkson (2019)	RCT	Dialysis	18(744)	Mixed	-	6MWT	MD:33.64(23.74,43.54)	-	<0.001	0.0%	Moderate
Zhao (2019)	RCT	Dialysis	3(141)	Mixed	-	Fatigue	SMD:-0.97(-1.32,-0.62)	Large	<0.001	47.0%	Low
			5(186)			PCS	SMD:0.31(0.02,0.61)	Small	0.04	46.0%	Low
			5(186)			MCS	SMD:0.30(-0.20,0.80)	Small	0.24	64.0%	Very low
Zhang (2019)	RCT	Predialysis	14(463)	Mixed	-	SBP	SMD:-0.41(-0.70,-0.11)	Small	0.007	55.0%	Moderate
			12(399)			DBP	SMD:-0.31(-0.71,0.08)	Small	0.12	70.0%	Low
			13(466)			BMI	SMD:-0.21(-0.39,-0.03)	Small	0.02	0.0%	Moderate

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Huang (2019)	RCT	HD	8(257)	Mixed	-	Kt/V	SMD:0.19(-0.06,0.43)	Small	0.14	0.0%	Very low
			7(260)			SBP	SMD:-0.17(-0.41,0.08)	Small	0.18	8.0%	Low
			7(260)			DBP	SMD:-0.23(-0.69,0.24)	Small	0.34	68.0%	Very low
			7(205)			6MWT	SMD:1.01(0.26,1.76)	Large	0.008	83.0%	Very low
			7(263)			PCS	SMD:0.34(0.09,0.59)	Small	0.007	27.0%	Low
			7(263)			MCS	SMD:0.27(0.02,0.51)	Small	0.03	0.0%	Low
			10(371)			VO_{2peak}	SMD:0.73(0.52,0.95)	Moderate	<0.001	71.0%	Low
Heiwe (2011)	RCT/quasi-RCT	Mixed	24(847)	Mixed	-	Aerobic capacity	SMD:-0.56(-0.70,-0.42)	Moderate	<0.001	12.0%	Moderate
			9(358)			Muscle strength	SMD:-0.52(-0.73,-0.31)	Moderate	<0.001	0.0%	Low
			7(191)			Walking capacity	SMD:-0.48(-0.79,-0.17)	Small	0.003	2.0%	Low
			9(347)			SBP	SMD:0.25(0.04,0.47)	Small	0.02	0.0%	Low
			11(419)			DBP	SMD:0.16(-0.04,0.36)	Small	0.11	40.0%	High
Heiwe (2014)	RCT	HD	21(374)	Mixed	-	Aerobic capacity	SMD:-0.80(-1.02,-0.58)	Large	<0.001	0.0%	Low
			10(212)			DBP	SMD:0.17(-0.16,0.49)	Small	0.3	45.0%	Low
			10(312)			SBP	SMD:0.04(-0..4,0.41)	Small	0.8	58.0%	Very low
			10(385)			Muscle strength	SMD:-0.56(-0.77,-0.35)	Moderate	<0.001	0.0%	Very low
			7(174)			Walking capacity	SMD:-0.33(-0.67,0.01)	Small	0.06	16.0%	Low
Matsuzawa (2017)	RCT	HD	18(582)	Mixed	-	VO_{2peak}	SMD:0.62(0.38,0.87)	Moderate	<0.001	49.0%	High
			10(326)			6MWT	SMD:0.58(0.24,0.93)	Moderate	<0.001	53.0%	Low
			9(281)			Muscle strength	SMD:0.94(0.67,1.21)	Large	<0.001	10.0%	Very low
			9(264)			PCS	SMD:0.53(0.52,0.82)	Moderate	<0.001	19.0%	Very low
			8(228)			MCS	SMD:0.14(-0.15,0.42)	Small	0.34	10.0%	Very low
Smart (2011)	RCT	HD	8(365)	Mixed	-	VO_{2peak}	SMD:0.75(0.39,1.11)	Moderate	<0.001	60.0%	Low
Bogataj	RCT	HD	19(571)	Mixed	-	6MWT	SMD:0.44(0.21,0.67)	Small	<0.001	49.6%	Very low

Study	Design	Population	N (n)	Exercise	Timing	Outcome	Effect size	Magnitude	p	I²	Quality
(2020)			20(504)			VO$_{2peak}$	SMD:0.58(0.32,0.85)	Moderate	<0.001	57.4%	Very low
			5(461)			STS 10	SMD:-0.55(-1.00,-0.09)	Moderate	0.019	71.6%	Very low
Sheng (2014)	RCT	HD	7(233)	Mixed	Intradialytic	Kt/V	SMD:0.27(0.01,0.53)	Small	0.040	0.0%	Very low
			7(310)			VO$_{2peak}$	SMD:0.53(0.30,0.76)	Moderate	<0.001	36.0%	Very low
			7(256)			PCS	SMD:0.30(0.05,0.55)	Small	0.02	39.5%	Very low
			5(167)			MCS	SMD:0.14(-0.16,0.43)	Small	0.37	14.8%	Very low
			4(146)			6MWT	SMD:0.58(0.23,0.93)	Moderate	<0.001	89.7%	Very low
			7(296)			DBP	SMD:-0.24(-0.47,-0.01)	Small	0.04	52.1%	Very low
			7(296)			SBP	SMD:-0.27(-0.50,-0.04)	Small	0.02	0.0%	Very low
			3(106)			STS 60	SMD:0.71(0.31,1.12)	Moderate	<0.001	0.0%	Very low
Neto (2018)	RCT	HD	10(394)	Mixed	Intradialytic	VO$_{2peak}$	SMD:0.60(0.15,1.04)	Moderate	0.008	76.0%	Very low
			7(187)			PCS	SMD:0.50(-0.19,1.18)	Moderate	0.16	62.0%	Very low
			7(185)			MCS	SMD:0.39(-0.19,0.98)	Small	0.19	50.0%	Very low
			6(158)			6MWT	SMD:0.96(0.11,1.80)	Large	0.03	82.0%	Very low
			9(250)			Muscle strength	SMD:0.61(0.39,0.83)	Moderate	<0.001	58.9%	Very low
Ferrari (2019)	RCT	HD	12(370)	AE	Intradialytic	Kt/V	MD:0.08(0,0.15)	-	0.04	56.0%	Low
			6(220)	RT		Kt/V	MD:0.1(0,0.2)	-	0.06	6.0%	Very low
			5(201)	COM		VO$_{2peak}$	MD:5.41(4.03,6.79)	-	<0.001	0.0%	Low
			7(248)	AE		VO$_{2peak}$	MD:2.07(0.42,3.72)	-	<0.001	0.0%	Very low
			6(211)	RT		6MWT	MD:68.5(29.05,107.96)	-	<0.001	36.0%	Low
			6(188)	AE		6MWT	MD:64.98(43.86,86.11)	-	<0.001	0.0%	Low
			10(332)	AE		SBP	MD:-10.07(16.35,-3.78)	-	0.002	44.0%	Low
			10(334)	AE		DBP	MD:-2.96(-7.71,1.78)	-	0.22	0.0%	Low
Wyngaert (2018)	RCT	Predialysis	8(269)	AE	-	SBP	SMD:0.08(-0.58,0.74)	Small	0.81	84%	Very low
			7(237)			DBP	SMD:-0.09(-0.78,0.59)	Small	0.79	83%	Very low

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			11(325)			VO$_{2peak}$	SMD:0.99(0.49,1.48)	Large	<0.001	74.0%	Very low
			9(294)			BMI	SMD:-0.36(-0.60,-0.13)	Small	0.002	48.0%	Low
Oguch (2018)	RCT	KTRs	4(182)	Mixed	-	VO$_{2peak}$	SMD:0.38(-0.06,0.82)	Small	0.09	45.0%	Low
			4(179)			HRQoL	SMD:0.54(0.02,1.07)	Moderate	0.04	58.0%	Very low
Ju (2020)	RCT		3 (115)	Mixed	-	HGS	SMD:0.52(0.14,0.89)	Moderate	0.007	0.0%	Very low
			3 (387)			Symptom/problem (KDQoL)	SMD:1.92(-1.06,4.90)	Large	0.21	99.0%	Very low
			3 (387)			Effects of kidney disease (KDQoL)	SMD:-3.69(-8.56,1.19)	Large	0.14	99.0%	Very low
			3 (387)			Burden of kidney disease (KDQoL)	SMD:1.04 (-0.75,2.82)	Large	0.26	98.0%	Very low

Abbreviation: RCT = randomized controlled trial; AE = aerobic exercise; RT = resistance training; COM = combine; VO$_{2peak}$ = peak oxygen uptake; HRQoL = health-related quality of life; DBP = diastolic blood pressure; SBP = systolic blood pressure; PCS = physical component summary; MCS = mental component summary; 6MWT = 6 minutes walk test; STS 10 = sit to stand 10 test; STS 30 = sit to stand 30 test; STS 60 = sit to stand 60 test; TUGT = timed up and go test; RLS = Restless Legs Syndrome; BMI = body mass index; SMD = standardized mean difference; MD = mean difference; HD = hemodialysis; KTRs = kidney transplant recipients; SF-36 = short form-36; KDQoL = kidney disease quality of life; GRADE = Grading of Recommendations Assessment, Development, and Evaluation.
*Number of included studies and corresponding sample size.
Mixed means aerobic exercise combined with resistance training.

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Supplementary Table S4 Results of the assessment of the methodological quality of the included meta-analyses using AMSTAR-2

Author	AMSTAR-2 Items																Score
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Pei(2019)	√	×	√	○	√	√	×	√	√	×	√	×	×	×	√	×	53.1%
Ferreira(2019)	√	√	√	○	√	√	×	○	√	×	√	×	×	×	×	×	50.0%
Cheema(2014)	√	×	√	√	√	√	√	√	√	×	√	√	√	√	√	√	87.5%
Wu(2020)	√	√	√	○	√	√	×	√	√	×	√	√	√	√	√	√	84.4%
Nakamura(2020)	√	√	√	○	√	√	×	√	√	×	√	√	√	√	√	√	84.4%
Lu(2019)	√	×	√	○	√	×	×	○	○	×	√	×	×	×	√	√	46.9%
Chen(2019)	√	×	√	○	×	√	×	√	○	×	√	×	×	×	×	√	43.8%
Song(2018)	√	×	√	○	√	√	×	√	√	×	√	×	√	√	√	√	71.9%
Salhab(2021)	√	√	√	○	√	√	×	√	×	×	√	×	×	√	×	×	53.1%
Andrade(2019)	√	√	√	○	√	√	×	√	√	×	√	×	×	√	×	√	65.6%
Chung(2016)	√	×	√	○	√	√	√	√	√	×	√	√	√	√	√	×	78.1%
Zhang(2019)	√	×	√	○	√	√	×	√	√	×	√	×	√	√	√	×	65.6%
Pu(2019)	√	×	√	○	√	√	×	√	√	×	√	√	√	√	×	√	71.9%
Yamamoto(2021)	√	×	√	×	√	√	×	○	√	×	√	√	√	√	√	√	71.9%
Thompson(2019)	√	×	√	○	√	√	×	√	√	√	√	√	√	√	√	√	84.4%
Yang(2017)	√	×	√	○	√	√	×	○	√	×	√	√	√	√	√	√	75.0%
Clarkson(2019)	√	×	√	○	√	√	×	√	√	×	√	√	√	√	√	√	78.1%
Zhao(2019)	√	×	√	○	√	√	×	√	√	×	√	×	√	×	×	√	59.4%
Zhang(2019)	√	×	√	○	√	√	×	○	√	×	√	√	×	×	√	√	62.5%
Huang(2019)	√	√	√	○	√	√	×	√	√	×	√	√	×	×	√	√	71.9%
Heiwe(2011)	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	100.0%
Heiwe(2014)	√	√	√	○	√	√	√	√	√	×	√	×	√	√	×	√	78.1%

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Matsuzawa(2017)	√	√	√	○	√	√	×	√	√	×	√	×	×	√	√	√	71.9%
Smart(2011)	√	×	√	○	√	×	×	○	○	×	√	×	×	√	×	×	40.6%
Bogataj(2020)	√	×	√	○	√	×	×	√	√	×	√	√	×	√	×	√	59.4%
Sheng(2014)	√	×	√	○	√	√	√	√	√	×	√	×	×	√	√	×	65.6%
Neto(2018)	√	×	√	○	√	√	×	√	√	×	√	×	×	×	×	√	53.1%
Ferrari(2019)	√	√	√	○	√	√	√	√	√	×	√	√	√	√	√	√	90.6%
Wyngaert(2018)	√	√	√	○	√	√	×	√	√	×	√	√	√	√	√	√	84.4%
Oguchi(2018)	√	√	√	○	√	√	×	√	√	×	√	√	√	×	√	×	71.9%
Ju(2020)	√	×	√	○	×	×	×	√	√	×	√	×	×	×	×	×	34.4%

√ mean yes; ○ mean partial yes; ×mean no.

1. Did the research questions and inclusion criteria for the review include the components of PICO? 2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol? 3. Did the review authors explain their selection of the study designs for inclusion in the review? 4. Did the review authors use a comprehensive literature search strategy? 5. Did the review authors perform study selection in duplicate? 6. Did the review authors perform data extraction in duplicate? 7. Did the review authors provide a list of excluded studies and justify the exclusions? 8. Did the review authors describe the included studies in adequate detail? 9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review? 10. Did the review authors report on the sources of funding for the studies included in the review? 11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results? 12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis? 13. Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review? 14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review? 15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review? 16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

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Supplementary Table S5: Results of the assessment of the quality of evidence for each outcome of the included meta-analyses using GRADE

Author	Outcome	GRADE items					Quality of the evidence
		Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	
Pei (2019)	VO$_{2peak}$	Very serious (-2)	Neutral	Neutral	Neutral	Neutral	Moderate
	STS 60	Serious (-1)	Very serious (-2)	Neutral	Neutral	Serious (-1)	Very low
	6MWT	Serious (-1)	Very serious (-2)	Neutral	Neutral	Serious (-1)	Very low
	SBP	Serious (-1)	Neutral	Neutral	Neutral	Not reported (-1)	Moderate
	DBP	Serious (-1)	Neutral	Neutral	Neutral	Not reported (-1)	Moderate
	Physical function (SF-36)	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	Physical role (SF-36)	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	Social function (SF-36)	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	Pain (SF-36)	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	General health (SF-36)	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	Mental health (SF-36)	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
Ferreira (2019)	Kt/V	Very serious (-2)	Very serious (-2)	Neutral	Serious (-1)	Not reported (-1)	Very low
Cheema (2014)	Muscle Strength	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	HRQoL	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
Wu (2020)	SBP	Very serious (-2)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	DBP	Very serious (-2)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low

Study	Outcome						
Nakamura (2020)	VO$_{2peak}$	Neutral	Serious (-1)	Neutral	Neutral	Serious (-1)	Moderate
	Muscle Strength	Very serious (-2)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	6MWT	Neutral	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	TUGT	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Lu (2019)	6MWT	Neutral	Neutral	Neutral	Serious (-1)	Neutral	Moderate
	STS 10	Neutral	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	HGS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	Muscle strength	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	STS 30	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
Chen (2019)	SBP	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	DBP	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	BMI	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	VO$_{2peak}$	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Song (2018)	RLS	Serious (-1)	Serious (-1)	Neutral	Very serious (-2)	Serious (-1)	Very low
	Fatigue	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Salhab (2019)	PCS	Not reported (-1)	Serious (-1)	Neutral	Very serious (-2)	Serious (-1)	Very low
	MCS	Not reported (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
Andrade (2019)	VO$_{2peak}$	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
Chung (2019)	6MWT	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	VO$_{2peak}$	Neutral	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	PCS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	MCS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
Zhang (2021)	6MWT	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	STS 30	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low

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	HGS	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	PCS	Very serious (-2)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	MCS	Very serious (-2)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Pu (2019)	Kt/V	Serious (-1)	Neutral	Neutral	Serious (-1)	Not reported (-1)	Very low
	VO_{2peak}	Neutral	Serious (-1)	Neutral	Neutral	Not reported (-1)	Moderate
	6MWT	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	PCS	Neutral	Serious (-1)	Neutral	Serious (-1)	Not reported (-1)	Very low
	MCS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Moderate
	SBP	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	DBP	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Yamamoto (2021)	SBP	Very serious (-2)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	VO_{2peak}	Very serious (-2)	Neutral	Neutral	Serious (-1)	Neutral	Very low
	BMI	Very serious (-2)	Neutral	Neutral	Neutral	Neutral	Low
Thompson (2019)	SBP	Very serious (-2)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	DBP	Very serious (-2)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
Yang (2017)	VO_{2peak}	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
Clarkson (2019)	6MWT	Neutral	Neutral	Neutral	Neutral	Serious (-1)	Moderate
Zhao (2019)	Fatigue	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	PCS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	MCS	Neutral	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
Zhang (2019)	SBP	Neutral	Serious (-1)	Neutral	Neutral	Neutral	Moderate
	DBP	Neutral	Serious (-1)	Neutral	Serious (-1)	Neutral	Low
	BMI	Serious (-1)	Neutral	Neutral	Neutral	Neutral	Moderate

Huang (2019)	Kt/V	Very serious (-2)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	SBP	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	DBP	Neutral	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	6MWT	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	PCS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	MCS	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	VO_{2peak}	Serious (-1)	Neutral	Neutral	Serious (-1)	Neutral	Low
Heiwe (2011)	Aerobic capacity	Neutral	Neutral	Neutral	Neutral	Serious (-1)	Moderate
	Muscle strength	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	Walking capacity	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	SBP	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	DBP	Neutral	Neutral	Neutral	Neutral	Neutral	High
Heiwe (2014)	Aerobic capacity	Neutral	Neutral	Neutral	Serious (-1)	Not reported (-1)	Low
	DBP	Neutral	Neutral	Neutral	Serious (-1)	Not reported (-1)	Low
	SBP	Neutral	Serious (-1)	Neutral	Serious (-1)	Not reported (-1)	Very low
	Muscle strength	Serious (-1)	Neutral	Neutral	Serious (-1)	Not reported (-1)	Very low
	Walking capacity	Neutral	Neutral	Neutral	Serious (-1)	Not reported (-1)	Low
Matsuzawa (2017)	VO_{2peak}	Neutral	Neutral	Neutral	Neutral	Neutral	High
	6MWT	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Neutral	Very low
	Muscle strength	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	PCS	Very serious (-2)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	MCS	Very serious (-2)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Smart (2011)	VO_{2peak}	Neutral	Serious (-1)	Neutral	Neutral	Serious (-1)	Low
Bogataj	6MWT	Serious (-1)	Serious (-1)	Neutral	Not reported (-1)	Not reported (-1)	Very low

(2020)	VO_{2peak}	Very serious (-2)	Serious (-1)	Neutral	Not reported (-1)	Not reported (-1)	Very low
	STS 10	Neutral	Serious (-1)	Neutral	Not reported (-1)	Serious (-1)	Very low
Sheng (2014)	Kt/V	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	VO_{2peak}	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	PCS	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	MCS	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	6MWT	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	DBP	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	SBP	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	STS60	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
Neto (2018)	VO_{2peak}	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Not reported (-1)	Very low
	PCS	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	MCS	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	6MWT	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low
	Muscle strength	Neutral	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
Ferrari (2019)	Kt/V (AE)	Neutral	Serious (-1)	Neutral	Serious (-1)	Neutral	Low
	Kt/V (RT)	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	VO_{2peak} (COM)	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	VO_{2peak} (AE)	Serious (-1)	Neutral	Neutral	Serious (-1)	Serious (-1)	Very low
	6MWT (RT)	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	6MWT(AE)	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	SBP	Serious (-1)	Neutral	Neutral	Serious (-1)	Neutral	Low
	DBP	Serious (-1)	Neutral	Neutral	Serious (-1)	Neutral	Low
Wyngaert (2018)	SBP	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
	DBP	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Serious (-1)	Very low

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	VO$_{2peak}$	Serious (-1)	Very serious (-2)	Neutral	Serious (-1)	Neutral	Very low
	BMI	Serious (-1)	Neutral	Neutral	Serious (-1)	Neutral	Low
Oguchi (2018)	VO$_{2peak}$	Neutral	Neutral	Neutral	Serious (-1)	Serious (-1)	Low
	HRQoL	Serious (-1)	Serious (-1)	Neutral	Serious (-1)	Serious (-1)	Very low
Ju (2020)	HGS	Very serious (-2)	Neutral	Neutral	Serious (-1)	Neutral	Very low
	Symptom/problem (KDQoL)	Very serious (-2)	Very serious (-2)	Neutral	Serious (-1)	Not reported (-1)	Very low
	effects of kidney disease (KDQoL)	Very serious (-2)	Very serious (-2)	Neutral	Serious (-1)	Not reported (-1)	Very low
	burden of kidney disease (KDQoL)	Very serious (-2)	Very serious (-2)	Neutral	Serious (-1)	Not reported (-1)	Very low

Abbreviation: AE = aerobic exercise; RT = resistance training; COM = combine; VO$_{2peak}$ = peak oxygen uptake; HRQoL = health-related quality of life; DBP = diastolic blood pressure; SBP = systolic blood pressure; PCS = physical component summary; MCS = mental component summary; 6MWT = 6 minutes walk test; STS 10 = sit to stand 10 test; STS 30 = sit to stand 30 test; STS 60 = sit to stand 60 test; TUGT = timed up and go test; BMI = body mass index; SMD = standardized mean difference; HD = hemodialysis; KTRs = kidney transplant recipients; SF-36 = short form-36; KDQoL = kidney disease quality of life;

Very serious mean the included studies existed two or more high risk of bias in terms of randomization, blinding, allocation concealment, completeness of result data, or selective reporting, or 75% $\leq I^2 \leq$100%.

Serious mean the included studies existed two or more high risk of bias in terms of randomization, blinding, allocation concealment, completeness of result data, or selective reporting, or 50% $\leq I^2 <$75%, or the included study sample size< 400, asymmetric funnel plot or less than 9 studies included.