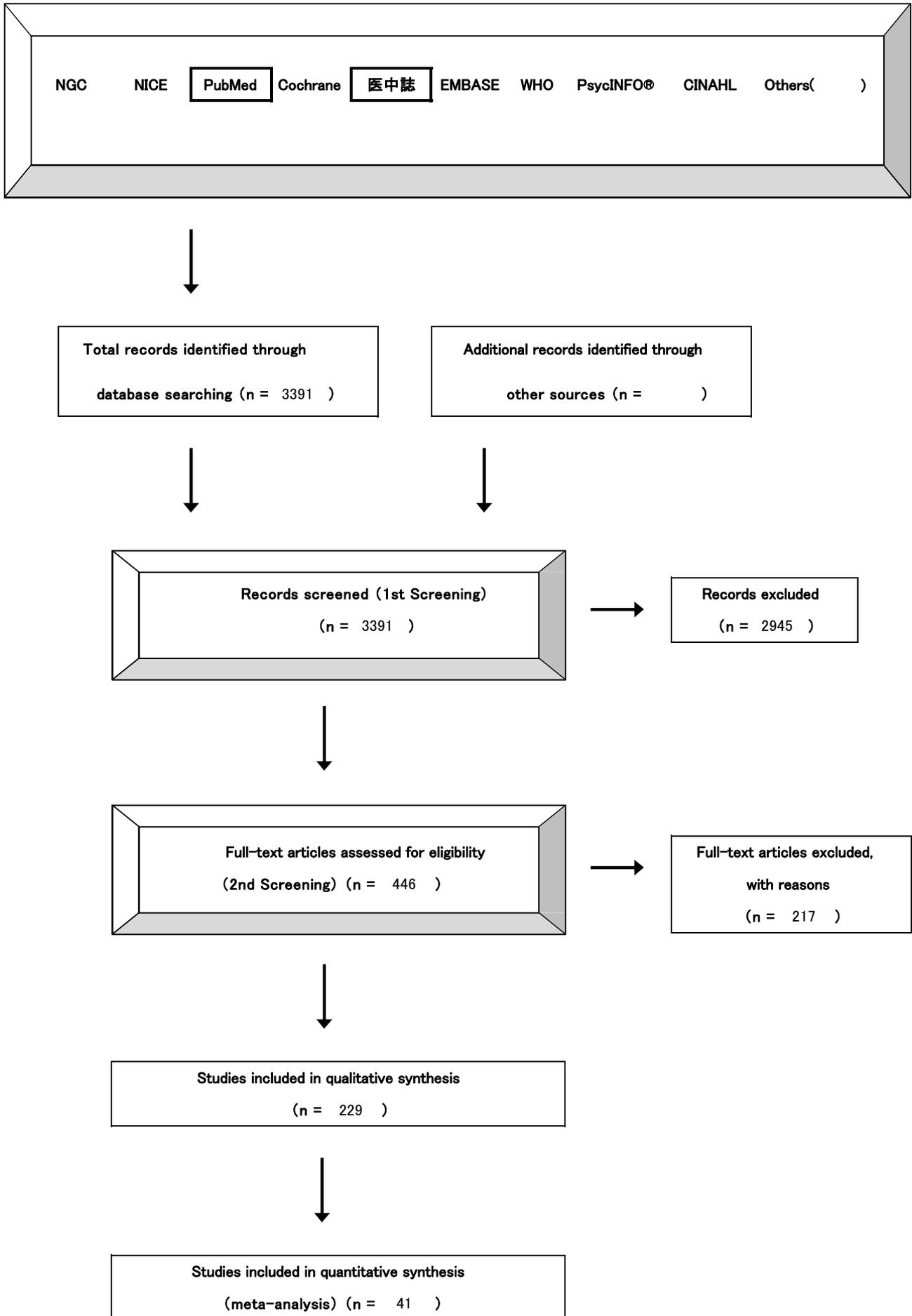


【4-1 データベース検索結果】

タイトル	
CQ	運動療法は透析患者において有用か？
データベース	pubmed、医中誌
日付	2017.3.24
検索者	新潟大学医学部附属病院 血液浄化部 山本卓 聖路加国際病院 腎臓内科 瀧中香

#	検索式	文献数
	("renal dialysis"[MeSH Terms] OR ("dialysis"[MeSH Terms] OR "dialysis"[All Fields] OR "dialyses"[All Fields]) AND Renal[tiab]) OR Renal Dialyses[tiab] OR Dialysis, Renal[tiab] OR Hemodialysis[tiab] OR Hemodialyses[tiab] OR ("renal dialysis"[MeSH Terms] OR ("renal"[All Fields] AND "dialysis"[All Fields]) OR "renal dialysis"[All Fields] OR "dialysis"[All Fields] OR "dialysis"[MeSH Terms]) AND Extracorporeal[tiab] OR ("dialysis"[MeSH Terms] OR "dialysis"[All Fields] OR "dialyses"[All Fields]) AND Extracorporeal[tiab] OR Extracorporeal Dialyses[tiab] OR Extracorporeal Dialysis[tiab] OR "kidney failure, chronic"[MeSH Terms] OR "renal insufficiency, chronic"[MeSH Terms] AND ("paresis"[MeSH Terms] OR "muscle weakness"[MeSH Terms]) OR "rest"[MeSH Terms] OR "bed rest"[MeSH Terms] OR "exercise"[MeSH Terms] OR "exercise therapy"[MeSH Terms] OR "exercise tolerance"[MeSH Terms] OR "sports"[MeSH Terms] OR rest[tiab] OR (exercis[tiab] OR exercisable[tiab] OR exercise[tiab] OR exercise'[tiab] OR exercise"[tiab] OR exercise's[tiab] OR exercise2[tiab] OR exerciseable[tiab] OR exercisealkalosis[tiab] OR exercisecardiac[tiab] OR exercised[tiab] OR exercised'[tiab] OR exercisee[tiab] OR exerciseee[tiab] OR exercisein[tiab] OR exerciseinduced[tiab] OR exerciseismedicine[tiab] OR exerciseit[tiab] OR exercisel[tiab] OR exerciselike[tiab] OR exerciselphysical[tiab] OR exercisemobilization[tiab] OR exercisenomics[tiab] OR exerciseonly[tiab] OR exerciser[tiab] OR exerciser's[tiab] OR exercisereally[tiab] OR exerciseresponse[tiab] OR exercisers[tiab] OR exercisers'[tiab] OR exercises[tiab] OR exercises'[tiab] OR exercisemay[tiab] OR exercisesprogram[tiab] OR exercisethe[tiab] OR exercisethree[tiab] OR exercisesubjects[tiab] OR exercisethere[tiab] OR exercisetion[tiab] OR exercisetolerance[tiab] OR exercisetrade[tiab] OR exercisevo2[tiab] OR exercisexstimulant[tiab] OR exercising[tiab] OR exercising'[tiab] OR exercisingkrats[tiab] OR exercisis[tiab]) OR (exertion[tiab] OR exertion'[tiab] OR exertion's[tiab] OR exertional[tiab] OR exertionally[tiab] OR exertionnal[tiab] OR exertions[tiab]) OR "frail elderly"[MeSH Terms] OR muscle mass[tiab] OR skeletal muscle[tiab] OR Frailty[tiab] OR Frail[tiab] OR physical activity[tiab]) AND "humans"[MeSH Terms]	3391
	(((血液透析/TH or 透析/AL) and (((リハビリテーション/TH or リハビリテーション/AL) or ((運動療法/TH or 運動療法/AL) or ((レジスタンストレーニング/TH or レジスタンス運動/AL) or ((身体運動/TH or 有酸素運動/AL) or (筋肉量/AL) or (身体活動度/AL) or ((虚弱高齢者/TH or フレイル/AL) or ((筋肉減少症/TH or サルコペニア/AL) or ((運動耐性/TH or 運動耐容能/AL) or ((身体運動/TH or 運動/AL)))))) and (LA=日本語 and PT=原著論文 and CK=ヒト)	

【4-2 文献検索フローチャート】 PRISMA声明を改変



【4-4 引用文献リスト】

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不採用論文		
その他の引用論文		

【4-5 評価シート 介入研究】

診療ガイドライン	腎臓リハビリテーション
対象	透析患者
介入	運動療法(有酸素運動、レジスタンス運動、それらの併用)、身体活動度
対照	運動療法非施行

* 各項目の評価は“高(+2)”、“中/軽(-1)”、“低(0)”の3段階
 まとめは“高(+2)”、“中(-1)”、“低(0)”の3段階でエビデンス総体に反映させる

各アウトカムごとに別紙にまとめる

アウトカム		QOL														効果指標(信頼)		効果指標(値)		信頼区間					
研究コード	研究デザイン	バイアスリスク*										非直捷性*				リスク人数(アウトカム率)				効果指標(信頼)	効果指標(値)	信頼区間			
		ランダム化	コンシメント	盲検化	盲検化	ITT	アウトカム不完全報告	選択的アウトカム報告	早期試験中止	その他のバイアス	まとめ	対象	介入	対照	アウトカム	まとめ	対照群分母	対照群分子	介入群分母				介入群分子		
517	RCT	0	0	-2	-2	-2	-1	0	0	0	-2	0	0	0	0	0	33		32			Total	対照群: 51.8±11.1 → 53.2±11.27, 介入群: 52.7±11.29 → 72.6±16.17. 各項目の数値の記載有り		
775	RCT	-1	-1	-2	-2	-1	-1	0	0	0	-2	0	0	0	0	0	11					KD-QOL	controlに比べ、strength groupでsocial support, patient satisfaction, general healthの項目が改善, aerobic groupでphysical functioning, pain, symptoms, sleeping, sexual function, energy/fatigueが改善. 具体的な数値はなし.		
841	RCT	-2	-2	-2	-2	-2	-2	0	0	0	-2	0	0	0	0	0	14					KD-QOL	controlに比べ、RMTでsleep, pain, energyが改善, PMTでsymptoms, sleep, pain, energyが改善. 改善した項目はグラフで示されている.		
1471	RCT	-1	-1	-2	-2	-1	-1	0	0	0	-2	0	0	0	0	0	14		19			PCS, MCS	Physical Component Scaleは対照群: 39.0±5.4 → 38.9±5.8, 介入群: 40.5±5.6 → 44.5±5.5. Mental Component Scaleは対照群: 40.3±6.9 → 40.1±6.8, 介入群: 41.8±10.1 → 41.8±10.0. Life Satisfaction Indexは対照群: 42.1±11.7 → 42.3±12.1, 介入群: 44.8±8.6 → 53.0±5.6.		
1705	RCT	0	0	-2	-2	0	0	0	0	0	-2	0	0	0	0	0	24		20			PF, VT	Physical Functionは対照群: 1.8±17.6, 介入群: 7.6±11.8. Vitalityは対照群: -7.0±14.1 → 2.3±16.0.		
2281	RCT	-1	-1	-2	-2	-2	-2	0	0	0	-2	0	0	0	0	0	usual Ht: 12, normal Ht: 13		usual Ht: 10, normal Ht: 13			GH/PF	General Healthについては、usual Ht+運動なし: 42.0±24.9 → 46.3±21.9, usual Ht+運動有り: 48.3±19.0 → 62.7±17.3. Normal Ht+運動なし: 50.0±24.1 → 48.5±26.4. Normal Ht+運動有り: 50.6±22.1 → 49.1±19.8. 他項目は変化なし.		
1664	RCT	0	-1	-2	-1	-1	-1	0	0	0	-1	0	0	0	0	0	32		17			介入群でPhysical Functioning, Role, physical, Vitality, Metal healthが有意に改善あり. 対照群では有意な改善なし. グラフのみで具体的な数値記載なし.			
2060	RCT	-1	-1	-2	-1	-1	0	0	0	0	-1	0	0	0	0	0	7		6			ヘームライン、4週、8週後で測定して有意差なし. 介入群: PF: 67.5±28.6 → 68.3±30.6, RE: 54.2±51 → 50.0±44.7, BP: 77.8±28.3 → 79.5±23.3, GH: 58.8±24.8 → 50.7±22.7, VT: 60.2±27.2 → 46.7±30.3, SF: 79.2±20.4 → 77.1±35.7, RP: 66.7±42.2 → 77.7±34.5, MH: 78.0±21.6 → 80.7±19.8. 対照群: PF: 68.6±28.5 → 65.7±27.1, RE: 60.7±43 → 71.4±30.4, BP: 76.6±14.8 → 86.6±13.2, GH: 57.9±25.3 → 50.1±22.4, VT: 62.1±18.0 → 62.9±14.1, SF: 71.4±22.5 → 80.3±20.3, RP: 71.4±40.5 → 90.5±25.2, MH: 83.4±12.5 → 84.3±16.9.			
418	RCT	0	0	-2	-1	-2	-2	0	0	0	-2	0	0	0	0	0						PCS: 1群: 9.5 (29.0 to 24.6) control: 2.4 (21.9 to 10.3) MCS: 1群: 1.4 (26.3 to 5.2) control: 6.0 (24.2 to 13.5) Role/social-CS: 1群: 1.5 (21.6 to 24.2) C群: 26.4 (21.0 to 40.2)			
2068	RCT	0	0	-2	0	-2	-2	0	0	0	-2	-1	-1	0	-1	11	7	63.6	22	10	45.5	PCS, MCS	PCS: 1群: 46.8(25-53) vs 47.0(33-55), C群: 41.1(32-52) vs 48.9(26-56) MCS: 1群: 59.7(35-65) vs 55.2(43-63), C群: 51.7(40-65) vs 55.1(34-62)	PCS: 1群のみ有意差あり(p<0.004) MCS: 有意差なし	
611	RCT	-1	-2	-2	-1	-1	-1	0	0	0	-2	-1	0	0	-1	13		13			Total	対照群: 1.8±8.4 → 1.16±8.32, 介入群: 1.41±5.7 → 1.42±6.1 (p=0.61). ※SF-36のどのスコアを示しているか記載がなく不明(もしくはすと、2つのサマリ尺度の数値の和?)			
1037	RCT(3群)	-1	-2	-2	-1	-1	-1	0	0	0	-2	-1	0	0	-1	10		11			PCS, MCS	(Physical component) 対照群: 51.4±8.6 → 50.6±6.8, 介入群: 46.5±5.2 → 51.7±4.4. (Mental component) 対照群: 59.3±9.6 → 59.3±5.6, 介入群: 54.8±3.4 → 59.5±5.5.			
1325	RCT(3群)	0	-2	-2	-2	-1	-1	0	0	0	-2	-1	0	0	-1	15		15			PCS, MCS	(Physical component) 対照群: 55±29 → 55±25, intradialytic群: 53±22 → 47±20, home based群: 50±23 → 56±25. (Mental component) 対照群: 66±26 → 64±25, intradialytic群: 60±22 → 58±20, home based群: 59±22 → 65±22. ※対照群をreferenceとした場合の変化量の差(平均および95%CI): (Physical component) intradialytic群: -7(-19.4 to 5.8), home based群: +6(-6.8 to 18.5), (Mental component) intradialytic群: 0(-9.4 to 9.2), home based群: +8(-1.4 to 17.2)			
1481	RCT?	-1	-2	-2	-1	-1	-1	0	0	0	-2	-1	-1	0	-1	7		13				(general health) 対照群: 35±25 → 26±26, 介入群: 37±22 → 33±17. (physical functioning) 対照群: 51±28 → 46±30, 介入群: 53±25 → 63±22. (physical role) 対照群: 41±44 → 62±44, 介入群: 43±40 → 83±32. (emotional role) 対照群: 58±37 → 62±45, 介入群: 64±46 → 77±38. (social functioning) 対照群: 77±23 → 73±24, 介入群: 69±29 → 80±20. (body pain) 対照群: 59±29 → 50±30, 介入群: 61±39 → 72±30. (vitality) 対照群: 57±20 → 51±20, 介入群: 55±26 → 57±16. (mental health) 対照群: 53±10 → 54±12, 介入群: 53±22 → 69±18. ※介入後の結果は、介入から一定期間あけたフォローアップ時の結果ではなく、介入を終了した直後(6か月時点)の結果を採用した.			

【4-9 メタアナリシス】

CQ		透析患者に運動療法は推奨されるか？																																																																																																																					
P	透析患者	I	運動療法(有酸素運動, レジスタンス運動, それらの併用), 身体活動度																																																																																																																				
C	運動療法非施行	O	身体機能評価(歩行機能)																																																																																																																				
研究デザイン	RCT	文献数	8	コード																																																																																																																			
モデル	Random Effect	方法	Inverse-variance Method (RevMan 5.3)																																																																																																																				
効果指標	Mean Difference	統合値	27.78 (11.15 - 44.41) P= 0.001																																																																																																																				
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Hirabayashi 2016	94.7	13.32	10	85.44	15.43	11	10.0%																																																																																				
Koh (Intra-dialytic) 2010	47	20	15	55	25	15	6.7%																																																																																				
Matsufuji 2015	9.5	0	6	2.4	0	11	Not estimable																																																																																				
Molsted 2004	47	0	10	55.2	0	7	Not estimable																																																																																				
Ouzouni 2009	44.5	5.5	19	38.9	5.8	14	26.0%																																																																																				
Woo-Jung 2012	7.9	9.9	20	-2.1	9.1	20	21.2%																																																																																				
Total (95% CI)	106			95			100.0%																																																																																				
	<p>コメント: Physical Component Summaryは有意な改善を認めたが, Mental Component Summaryは改善傾向にあったが, 統計学的には有意ではなかった。I²はPCSで61%, MCSで69%であり, 非一貫性を認めた。</p>																																																																																										
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【4-9 メタアナリシス】

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P	透析患者	I	運動療法(有酸素運動, レジスタンス運動, それらの併用), 身体活動度																																																																																																																																																																																																																																																					
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Roberedo 2010	3.9	0.3	11	4.1	0.5	11	10.6%	-0.20 [-0.54, 0.14]																																																																																																						
W'ilund 2010	3.8	0.06	7	3.9	0.15	8	16.1%	-0.10 [-0.21, 0.01]																																																																																																						
Total (95% CI)	105			130			100.0%	0.02 [-0.16, 0.20]																																																																																																						
	<p>コメント: アルブミンは二群間で有意な差はみられなかった. さらにI²は88%であり, 非一貫性が認められた.</p>																																																																																																													
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【4-9 メタアナリシス】

CQ		透析患者に運動療法は推奨されるか？																																													
P	透析患者	I	運動療法(有酸素運動, レジスタンス運動, それらの併用), 身体活動度																																												
C	運動療法非施行	O	筋肉量																																												
研究デザイン	RCT	文献数	2	コード																																											
モデル	Random Effect	方法	Inverse-variance Method (RevMan 5.3)																																												
効果指標	Mean Difference	統合値	4.99 (-2.81 - 12.79) P= 0.21																																												
Forest plot	<table border="1"> <thead> <tr> <th rowspan="2">Study or Subgroup</th> <th colspan="3">Experimental</th> <th colspan="3">Control</th> <th rowspan="2">Weight</th> <th rowspan="2">Mean Difference IV, Random, 95% CI</th> </tr> <tr> <th>Mean</th> <th>SD</th> <th>Total</th> <th>Mean</th> <th>SD</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Cheema 2007</td> <td>1.2</td> <td>5.8</td> <td>20</td> <td>-0.9</td> <td>7.9</td> <td>24</td> <td>65.5%</td> <td>2.10 [-1.96, 6.16]</td> </tr> <tr> <td>Giannaki 2013</td> <td>7.32</td> <td>16.03</td> <td>15</td> <td>-3.15</td> <td>7.87</td> <td>7</td> <td>34.5%</td> <td>10.47 [0.48, 20.46]</td> </tr> <tr> <td>Total (95% CI)</td> <td></td> <td></td> <td>35</td> <td></td> <td></td> <td>31</td> <td>100.0%</td> <td>4.99 [-2.81, 12.79]</td> </tr> </tbody> </table> <p>Heterogeneity: Tau² = 19.90; Chi² = 2.32, df = 1 (P = 0.13); I² = 57% Test for overall effect: Z = 1.25 (P = 0.21)</p> <p>コメント: 下腿筋断面積を指標として採用したが, 運動療法で改善傾向であったが, 統計学的には有意ではなかった. また, I²は57%であり, 非一貫性の存在が疑われた.</p>					Study or Subgroup	Experimental			Control			Weight	Mean Difference IV, Random, 95% CI	Mean	SD	Total	Mean	SD	Total	Cheema 2007	1.2	5.8	20	-0.9	7.9	24	65.5%	2.10 [-1.96, 6.16]	Giannaki 2013	7.32	16.03	15	-3.15	7.87	7	34.5%	10.47 [0.48, 20.46]	Total (95% CI)			35			31	100.0%	4.99 [-2.81, 12.79]
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【4-9 メタアナリシス】

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【4-9 メタアナリシス】

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P	透析患者	I	運動療法(有酸素運動, レジスタンス運動, それらの併用), 身体活動度		
C	運動療法非施行	O	生命予後		
研究デザイン	RCT	文献数	27	コード	
モデル	Univariate Logistic	方法			
効果指標	Risk Ratio	統合値	0.168 (0.064 - 0.440) P= <0.001		
Forest plot					
	コメント:				
Funnel plot					
	コメント:				
その他の解析					コメント:
メタリグレッション					死亡数が0のstudyがほとんどを占めたため, 総数における死亡者数の割合を比較した.
感度分析					

【4-10 SR レポートのまとめ】

運動療法の効果が多岐にわたることから、透析患者の生命予後、運動耐容能、QOL、身体機能評価（歩行機能、筋力）、筋肉量、アルブミン、ADL、透析量(Kt/V)、C-reactive protein (CRP)をアウトカムとした。Pubmed を用いて別に示す検索式にてシステマチックレビューを行った結果、3,391 編の論文が検索された。タイトル、抄録から 1 次スクリーニングを行い、本文による 2 次スクリーニングを経て、最終的に 41 編の RCT が残った。透析患者における透析中の運動療法は、運動耐容能(peak VO₂, max VO₂)、SF-36 の physical および mental component summary を指標とした QOL、6 分間歩行距離を指標とした身体機能評価、Kt/V において有意な改善を認めた。また、筋力を指標とした身体機能評価、筋肉量、血中アルブミン、CRP については統計学的には有意ではなかった。研究期間中の生命予後についても事後解析を行ったが運動療法群で有意な改善効果は認めなかった。