NKR10 PICO 5 rehabilitering af KOL. RT and ET versus Endurance training (ET) for COPD

Characteristics of studies

Characteristics of included studies

Alexander 2008

Methods	RCT
Participants	27 randomised, ET+RT=10, ET=10, drop out= 7
Interventions	8-10 weeks of training (16 exercise sessions)
Outcomes	6MWT, muscle strength
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not described
Incomplete outcome data (attrition bias)	High risk	7/20 dropped out, 5 in intervention group versus 2 in control group
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	Low risk	Not detected

Aquino 2016

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention 1 ● *COPD severity (GOLD/MRC)*: 67.71 (11.77) FEV1%, pred., 2.57 (0.97) MRC ● *Male (%)*: ● *Age (range)*: 65.0 (8.26) age, years Intervention 2 ● *COPD severity (GOLD/MRC)*: ● *Male (%)*: ● *Age (range)*: Control ● *COPD severity (GOLD/MRC)*: 69.14 (10.38) FEV1, pred., 2.85 (0.69) MRC ● *Male (%)*: ● *Age (range)*: 69.42 (7.39) age, years Overall ● *COPD severity (GOLD/MRC)*: 68.42 (11.54) FEV1, pred., 2.70 (0.95) MRC ● *Male (%)*: ● *Age (range)*: 67.21 (7.87) age, years **Included criteria:** The inclusion criteria for the enrollment were as follows: age .50years; former smokers, Tiffenau index (forced expiratory volume in the first second [FEV1]/forced vital capacity [FVC]) ,70% and FEV1 postbronchodi-lator ,80% of predicted value, reversibility of FEV1,12% of basic value and ,200mL of absolute value (30minutes after 400mg salbutamol inhalation), and stable COPD diagnosis. **Excluded criteria:** The exclusion criteria were as follows: contrain-dication for physical activity practice; usage of oxygen therapy; evidence of dementia, evaluated by Mini-Mental State Evaluation;15 history of brain injury; history of stroke; history of alcoholism; presence of anxiety and depressive symptoms, evaluated, respectively, by Hamilton Rating Scale for Anxiety16,17 and Beck Depression Inventory;18,19usage of medication influencing cognition; and presence of comorbidity incompatible with the experimental protocol practice. **Pretreatment:** The two groups were homogeneous in terms of age, instruction levels, functional status, Medi-cal Research Council Scale scores, severity of the COPD, comorbidities, medications, and cognitive scores
Interventions	**Intervention Characteristics** Intervention 1 ● *Description*: Combined training: a training protocol composed by high-intensity aerobic and resistance exercises, associated with respiratory, balance, and mobility exercises; and the second group ● *Length (weeks)*: 4 weeks ● *Longest follow-up (after end of treatment)*: After end of treatment Intervention 2 ● *Description*: ● *Length (weeks)*: ● *Longest follow-up (after end of treatment)*: Control

	● *Description*: Aerobic training: a training protocol composed by high-intensity aerobic exercises, asso-ciated with respiratory, balance, and mobility exercises ● *Length (weeks)*: 4 weeks ● *Longest follow-up (after end of treatment)*: After end of treatment
Outcomes	*Dropout, n* ● **Outcome type**: DichotomousOutcome *Muscle strength, SD* ● **Outcome type**: ContinuousOutcome *Walk test (6-min or SWT), SD* ● **Outcome type**: ContinuousOutcom
Notes	**Country:** Italy **Setting:** Patients from nursing home **Authors name:** Giovanna aquino **Institution:** Department of Medicine and health sciences “Vincenzo Tiberio”, University of Molise, Campobasso. **Email:** giovanna.aquino@unimol.it **Address:** Department of Medicine and health sciences “Vincenzo Tiberio”, University of Molise, 86100 Campobasso, Italy

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Participants' randomization into the two groups was per- formed using a random number list, generated using the online software (https://www.random.org/sequences/, Dublin, Ireland). The procedure described was as follows: a progressive number was assigned to each of the participants in alphabetical order according to their surname; a random number list was subsequently generated; and, in accordance with this random number list order, the participants were allo- cated in blocks of two participants per group in the order CT and AT."
Allocation concealment (selection bias)	Unclear risk	Quote: "The procedure described was as follows: a progressive number was assigned to each of the participants in alphabetical order according to their surname; a random number list was subsequently generated; and, in accordance with this random number list order, the participants were allo- cated in blocks of two participants per group in the order CT and AT. After" Judgement Comment: Unclear if this was an open random allocation schedule
Blinding of participants and personnel (performance bias)	Unclear risk	Nothing mentioned
Blinding of outcome assessment (detection bias)	Unclear risk	Nothing mentioned
Incomplete outcome data (attrition bias)	Low risk	No apparent sources of bias
Selective reporting (reporting bias)	Low risk	No apparent sources of bias
Other bias	Low risk	No apparent sources of bias

Bernard 1999

Methods	RCT
Participants	45 randomised, ET+RT=21, ET=15, drop out=9
Interventions	12 weeks of training
Outcomes	HRQoL(CRQ), 6MWT, C-P exercise test, muscle strength
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Toss of a coin
Allocation concealment (selection bias)	Low risk	Block randomisation
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not described
Incomplete outcome data (attrition bias)	Low risk	5 patients in intervention group and 4 in control group dropped out, likely unrelated to intervention according to reasons stated.
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	High risk	Uneven sex distribution, 11/4 males/females in contriol grpoup versus 17/4 in intervention group. Also higher BMI in intervention group and higher intensity training, 38/28 Watts

Covey 2014

Methods	**Study design:** Randomized controlled trial **Study grouping:** Crossover
Participants	**Baseline Characteristics** Intervention 1 ● *COPD severity (GOLD/MRC)*: 41 (10) FEV1, % of pred. ● *Male (%)*: 24/4 (male/female) ● *Age (range)*: 68 (8) age, years Intervention 2 ● *COPD severity (GOLD/MRC)*: ● *Male (%)*: ● *Age (range)*: Control ● *COPD severity (GOLD/MRC)*: 39 (9) FEV1, % of pred. ● *Male (%)*: 25/2 (male/female) ● *Age (range)*: 68 (7) age, years Overall ● *COPD severity (GOLD/MRC)*: ● *Male (%)*: ● *Age (range)*: **Included criteria:** The eligibility criteria included: forced expiratory volume in one second (FEV1)/forced vital capacity0.7 and FEV155% predicted, age45 years,and currently in stable clinical condition (eg, no exacerbations within two months of enrollment or recent change in medical therapy). Screening procedures included: pulmonary function tests, medical history and physical examination, chest X-ray, resting electrocardiogram, bloodchemistries, hematology and urinalysis. **Excluded criteria:** **Pretreatment:** There were no significant differences in sample characteristics between the three groups
Interventions	**Intervention Characteristics** Intervention 1 ● *Description*: Aerobic and resistance training ● *Length (weeks)*: 8 weeks ● *Longest follow-up (after end of treatment)*: After end of treatment Intervention 2 ● *Description*: ● *Length (weeks)*: ● *Longest follow-up (after end of treatment)*: Control ● *Description*: Aerobic training ● *Length (weeks)*: 8 weeks ● *Longest follow-up (after end of treatment)*: After end of treatment
Outcomes	*Quality of life, SD* ● **Outcome type**: ContinuousOutcome *Dropout, n* ● **Outcome type**: DichotomousOutcome *ADL, SD* ● **Outcome type**: ContinuousOutcome *Muscle strength, SD* ● **Outcome type**: ContinuousOutcome *Walk test (6-min or SWT), SD* ● **Outcome type**: ContinuousOutcome
Notes	**Sponsorship source:** The source of support for this research was The National Institute of Nursing Research R01-NR10249 and the Department of Veterans Affairs, United States of America. The contents of this paper are solely the responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health or the Depart-ment of Veterans Affairs **Country:** USA **Comments:** ClinicalTrials.gov Identifier: NCT01058213. **Authors name:** Margaret K. Covey **Institution:** Department of Biobehavioral Health Science, University of Illinois at Chicago, Chicago, IL,United States **Email:** mkcovey@uic.edu, margaretcovey@gmail.com **Address:** University of Illinois at Chicago, Department of Biobehavioral Health Science, M/C 802, 845 S. Damen Avenue,Chicago, IL 60612, United States. **Outcomes** Dropout: unknown when in the process the patients dropped out (cross over design)Muscle strength: 1RMWalk test: 6-minADL: CHAMPS, activity questionaire for Older adults.

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Randomization to group was stratified by gender (strata: male, female) and disease severity (strata: FEV 1 30%e55% predicted, FEV 1 < 30% predicted) with a software program (biased coin algorithm to ensure equivalent groups) [7]."
Allocation concealment (selection bias)	Unclear risk	Judgement Comment: Nothing mentioned
Blinding of participants and personnel (performance bias)	Unclear risk	Quote: "patients were not informed of the intent of the three group research design or the expected outcomes of the study." Judgement Comment: It is unclear if personnel was blinded
Blinding of outcome assessment (detection bias)	Low risk	Quote: "Data collectors were blinded to group assignment and"
Incomplete outcome data (attrition bias)	Unclear risk	Judgement Comment: There are the same number of patients who dropped out during training. Yet it is not explained during which type of training the dropout took place (cross-over design)
Selective reporting (reporting bias)	Low risk	Judgement Comment: Matches study protocol
Other bias	Low risk	No other apparent sources of bias

Daabis 2017

Methods	**Study design:** Randomized controlled trial **Study grouping:** Parallel group
Participants	**Baseline Characteristics** Intervention 1 ● *COPD severity (GOLD/MRC)*: 2.62 (0.76) mMRC; 53.2 (9.5) FEV1% ● *Male (%)*: ● *Age (range)*: 58 (7), age Intervention 2 ● *COPD severity (GOLD/MRC)*: ● *Male (%)*: ● *Age (range)*: Control ● *COPD severity (GOLD/MRC)*: 2.62 (0.76) mMRC, 53.2 (9.5) FEV1% ● *Male (%)*: ● *Age (range)*: 61 (8), age Overall ● *COPD severity (GOLD/MRC)*: ● *Male (%)*: ● *Age (range)*: **Included criteria:** Patients admitted to chest diseases department, Alexandria Main University Hospital with a primary diagnosis of acute exacerbation of COPD. **Excluded criteria:** Exclusion criteria:(1) Hypoxemic patients at rest or exercise.(2) Comorbidity that could limit exercise training like car-diovascular, musculoskeletal or neuromuscular diseases.(3) Patients who attended a pulmonary rehabilitation pro-gram in the preceding year **Pretreatment:** No significant differences were found between groupsin terms of age, BMI, airflow obstruction, or arterial bloodgases
Interventions	**Intervention Characteristics** Intervention 1 ● *Description*: The CT consisted of 30 min of ST which consisted of exer-cises performed on weight training machines, for pectoralismajor, deltoid, biceps brachii, triceps and quadriceps muscles.Patients were submitted to three sets of 12 repetitions with a 2-min rest between sets and with a workload at 50–80% of thatachieved on the 1-RM test. The 1-RM test was repeated every2 weeks to reestablish the workload. ● *Length (weeks)*: 8 weeks ● *Longest follow-up (after end of treatment)*: After end of treatment Intervention 2 ● *Description*: ● *Length (weeks)*: ● *Longest follow-up (after end of treatment)*: Control ● *Description*: Exercise training programs lasted for 8 weeks, in the form ofthree sessions per week. The ET consisted of 30 minutes oftreadmill training at an intensity of 75% of the results of the6MWT and an additional 30-min of low-intensity resistancetraining with free weights. The number of repetitions usedwas based on physiologic endurance principles, including ahigh number of repetitions with a low load ● *Length (weeks)*: 8 weeks ● *Longest follow-up (after end of treatment)*: After end of treatment
Outcomes	*Quality of life, SD* ● **Outcome type**: ContinuousOutcome *Muscle strength, SD*

	● **Outcome type**: ContinuousOutcome *Walk test (6-min or SWT), SD* ● **Outcome type**: ContinuousOutcome
Notes	**Country:** Eqypt **Setting:** Patients admitted to chest disease department at Alexandria Main University Hospital. **Authors name:** Rasha Daabis **Institution:** Department of Chest Diseases, Faculty of Medicine, Alexandria University, Alexandria, Egypt **Email:** rgdaabis@yahoo.com; rgdaabis@gmail.com **Address:** Department of Chest Diseases, Faculty of Medicine, Alexandria University, Alazarita, Alkhartoom Square, Egypt **Outcomes** Quality of life: Sct. georges respiratory Questionnaire for COPD SGRQ%Muscle strength: Quadracips strength (1RM, kg)Walk test: 6-min, meter

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Before being discharged on optimal medical treatment, patients were randomly allocated to three groups." Judgement Comment: Unclear how this was done
Allocation concealment (selection bias)	Unclear risk	Judgement Comment: Nothing mentioned, no description
Blinding of participants and personnel (performance bias)	Unclear risk	Judgement Comment: Nothing mentioned
Blinding of outcome assessment (detection bias)	Unclear risk	Judgement Comment: Nothing mentioned
Incomplete outcome data (attrition bias)	Unclear risk	Judgement Comment: 45 patients were admitted to the study. 30 completed. It is unknown what happened to the remaining 15 patients and in which groups they were allocated.
Selective reporting (reporting bias)	Low risk	No other apparent sources of bias
Other bias	Low risk	No other apparent sources of bias

Dourado 2009

Methods	RCT
Participants	51 randomised, total drop out n 13, ET+RT=11, control=13 (RT only=11)
Interventions	12 weeks of training
Outcomes	Adverse events, HRQoL, 6MWT, muscle strength
Notes	part of ET vs RT

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not stated
Incomplete outcome data (attrition bias)	High risk	Almost 1/3 dropped out
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	Low risk	Not detected

Mador 2004

Methods	RCT
Participants	32 randomised, ET+ET+education=11, ET+education=13, 4 drop out in each group
Interventions	8 weeks of training
Outcomes	HRQoL(CRQ), 6MWT, muscle strength, C-P exercise test
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Randomised in blocks of 3-5, method not described
Allocation concealment (selection bias)	Low risk	Opaque, sealed envelopes
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Low risk	Assessors blinded
Incomplete outcome data (attrition bias)	Low risk	Few dropouts, four in each group

Selective reporting (reporting bias)	Low risk	Not detected
Other bias	High risk	Patients were significantly older in intervention group, 68 versus 74 years.

Nakamura 2008

Methods	RCT
Participants	42 randomised, ET+RT=10, ET=13, drop out=9
Interventions	12 weeks of training
Outcomes	6MWT, HRQoL(SF 36), C-P exercise test, muscle strength(grip strength?)
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not reported
Incomplete outcome data (attrition bias)	High risk	Uneven distribution of dropouts
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	Low risk	Not detected

Ortega 2002

Methods	RCT
Participants	54 randomised, ET=16, ET+RT=14 (RT only=17) 7 dropouts
Interventions	12 weeks of training
Outcomes	HRQoL, SWT, C-P exercise test, muscle strength
Notes	part of RT vs ET

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not stated
Incomplete outcome data (attrition bias)	Low risk	Small dropout rate
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	Low risk	Not detected

Panton 2003

Methods	RCT
Participants	18 randomised, ET+RT=9, ET=8, drop out=1
Interventions	12 weeks of training
Outcomes	ADL, 12MWT, muscle strength
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	High risk	Two patients were ascribed to the control group "due to time restraints"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not described
Incomplete outcome data (attrition bias)	Low risk	One drop out in control group, dropped out due to cancer recurrence
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	Low risk	Not detected

Philips 2006

Methods	RCT
Participants	24 randomised, ET+RT=9, ET=10, drop outs=5? only 4 reported
Interventions	8 weeks of training
Outcomes	Adverse events, 6MWT, muscle strength
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not described
Incomplete outcome data (attrition bias)	Low risk	Two drop outs
Selective reporting (reporting bias)	Low risk	Not detected
Other bias	High risk	One patient crossed over from intervention to control group due to low back pain and one was excluded from the control group due to "anomalous change in strength"

Ries 1988

Methods	RCT
Participants	45 randomised, ET+RT=9, ET=11, drop out=17
Interventions	6 weeks of training
Outcomes	ADL, C-P exercise test
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	Not described
Incomplete outcome data (attrition bias)	High risk	High drop out rate, 17/45
Selective reporting (reporting bias)	High risk	VO2 max not reported, though meassured.
Other bias	Low risk	Not detected

Vonbank 2012

Methods	RCT
Participants	36 patients with COPD - stable outpatients with COPD
Interventions	Three arms ET only, ST only or ST and ET, three months
Outcomes	HRQoL, C-P exercise test,
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	not stated
Allocation concealment (selection bias)	Unclear risk	not stated
Blinding of participants and personnel (performance bias)	High risk	Blinding not possible
Blinding of outcome assessment (detection bias)	Unclear risk	not stated
Incomplete outcome data (attrition bias)	Low risk	7 of 43 randomised dropped out, but all due to exacerbations. Not clear from which groups
Selective reporting (reporting bias)	Low risk	none detected
Other bias	Low risk	none detected

Wurtemberger 2001

Methods	RCT in German
Participants	69 COPD patients. Subgroups: with or without supplemental oxygen
Interventions	ET plus RT and ET alone (and RT alone)
Outcomes	6MWT, C-P exercise test, ADL
Notes	

Risk of bias table

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	not described
Allocation concealment (selection bias)	Unclear risk	not described
Blinding of participants and personnel (performance bias)	Unclear risk	not described
Blinding of outcome assessment (detection bias)	Unclear risk	not described
Incomplete outcome data (attrition bias)	Unclear risk	not described
Selective reporting (reporting bias)	Unclear risk	not described
Other bias	Unclear risk	not described

Footnotes

Characteristics of excluded studies

Footnotes

Characteristics of studies awaiting classification

Footnotes

Characteristics of ongoing studies

Footnotes

Summary of findings tables

Additional tables

References to studies

Included studies

Alexander 2008

[Empty]

Aquino 2016

[Empty]

Bernard 1999

[Empty]

Covey 2014

[Empty]

Daabis 2017

[Empty]

Dourado 2009

[Empty]

Mador 2004

[Empty]

Nakamura 2008

[Empty]

Ortega 2002

[Empty]

Panton 2003

[Empty]

Philips 2006

[Empty]

Ries 1988

[Empty]

Vonbank 2012

[Empty]

Wurtemberger 2001

[Empty]

Excluded studies

Studies awaiting classification

Ongoing studies

Other references

Additional references

Other published versions of this review

Classification pending references

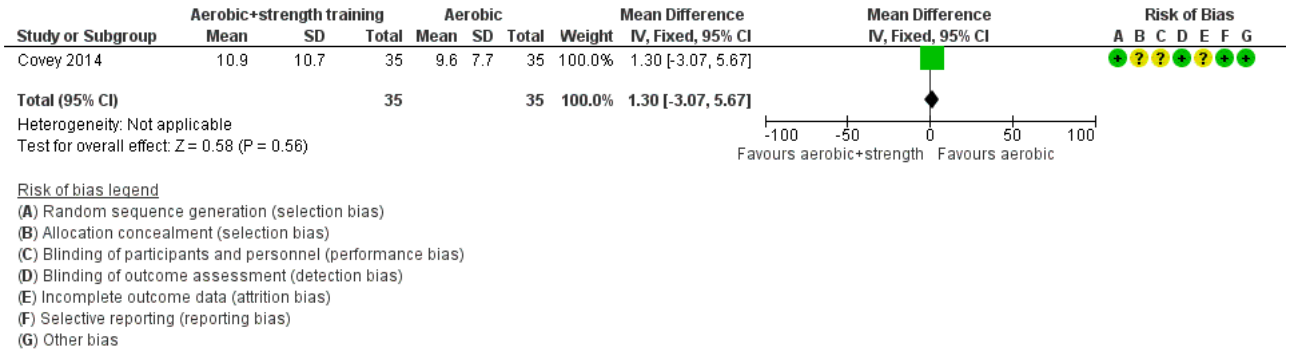
Data and analyses

1 Strength plus endurance training versus endurance training only for COPD. final and change combined

Outcome or Subgroup	Studies	Participants	Statistical Method	Effect Estimate
1.1 Quality of life. End of treatment. (CRQ+SGRQ))	7	238	Std. Mean Difference (IV, Random, 95% CI)	0.02 [-0.24, 0.27]
1.3 ADL. End of treatment (CHAMPS)	1	70	Mean Difference (IV, Fixed, 95% CI)	1.30 [-3.07, 5.67]
1.4 Walking test. End of treatment (6MWT))	9	268	Mean Difference (IV, Random, 95% CI)	3.00 [-26.86, 32.85]
1.5 Muscle strength. End of treatment	11	322	Std. Mean Difference (IV, Random, 95% CI)	0.56 [0.34, 0.79]
1.6 Dropout	8	281	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.70, 1.82]

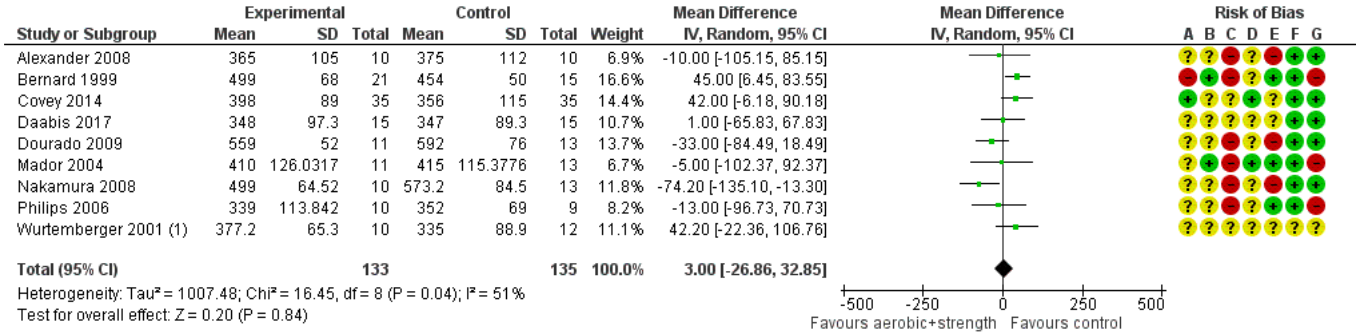
Figures

Figure 1 (Analysis 1.3)



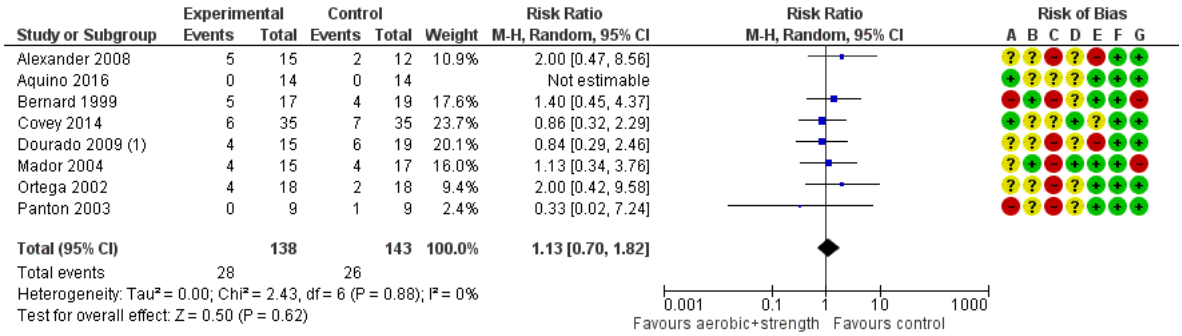
Forest plot of comparison: 1 Strength plus endurance training versus endurance training only for COPD, outcome: 1.3 ADL. End of treatment (CHAMPS).

Figure 2 (Analysis 1.4)



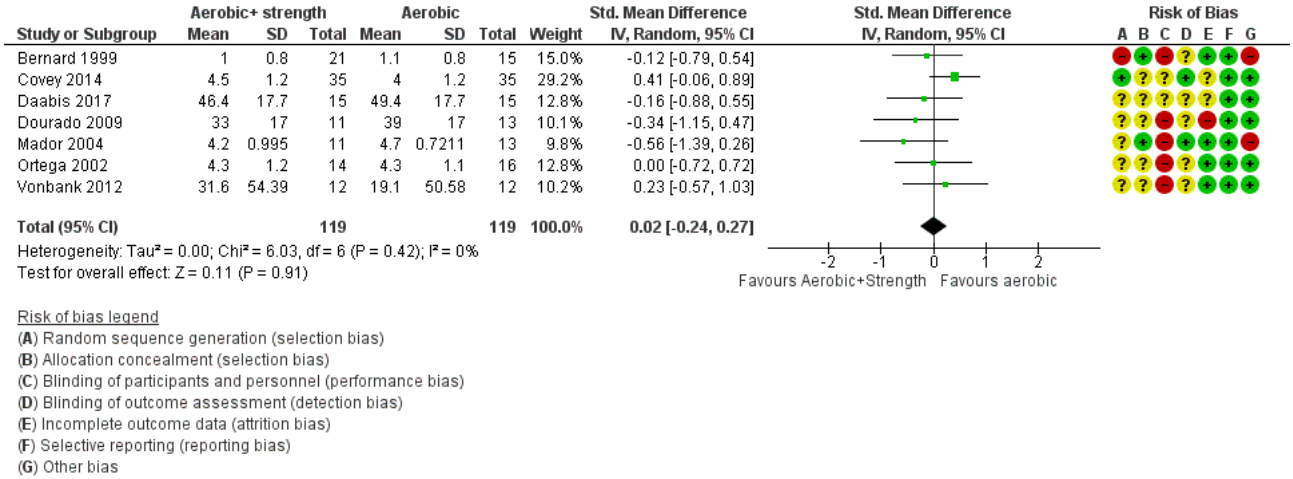
Forest plot of comparison: 1 Strength plus endurance training versus endurance training only for COPD, outcome: 1.4 Walking test. End of treatment (6MWT)).

Figure 3 (Analysis 1.6)



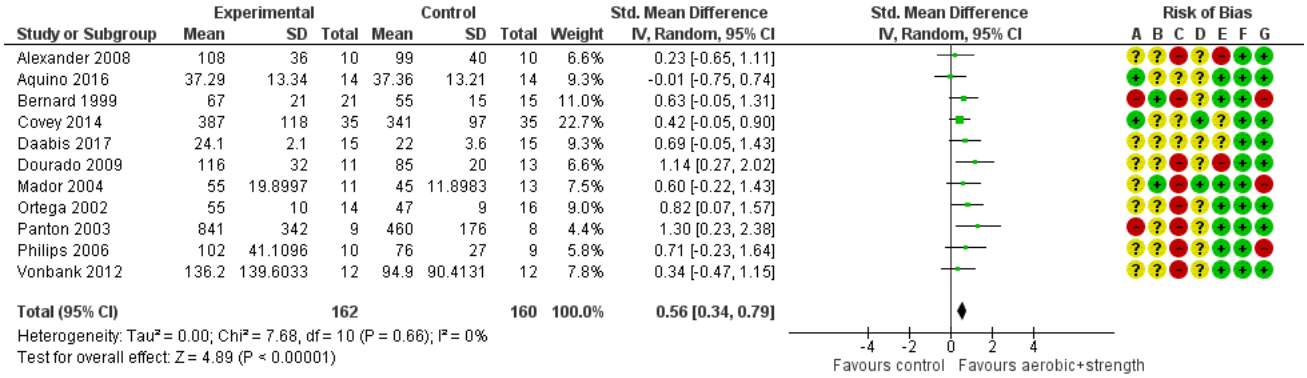
Forest plot of comparison: 1 Strength plus endurance training versus endurance training only for COPD, outcome: 1.6 Dropout.

Figure 4 (Analysis 1.1)



Forest plot of comparison: 1 Strength plus endurance training versus endurance training only for COPD. final and change combined, outcome: 1.1 Quality of life. End of treatment. (CRQ+SGRQ)).

Figure 6 (Analysis 1.5)



Risk of bias legend
(**A**) Random sequence generation (selection bias)
(**B**) Allocation concealment (selection bias)
(**C**) Blinding of participants and personnel (performance bias)
(**D**) Blinding of outcome assessment (detection bias)
(**E**) Incomplete outcome data (attrition bias)
(**F**) Selective reporting (reporting bias)
(**G**) Other bias

Forest plot of comparison: 1 Strength plus endurance training versus endurance training only for COPD, outcome: 1.5 Muscle strength. End of treatment.