Supplementary Table 1. Search strategy (up to January 10th 2015).

MEDLINE – Result: 253 studies

1. 'clinical trial'** OR 'controlled trial'** OR 'randomized controlled trial'* OR 'randomised controlled trial'** OR 'randomized'** OR 'randomised'** OR 'trial'** OR 'controlled clinical trial'**

2. 'metabolic syndrome'** OR 'metabolic syndrome x'*

3. 1 and 2

4. 'resisted training'** OR 'resistance training'* OR 'resisted exercise'** OR 'resistance exercise'** OR 'strength training'** OR 'strength exercise'**

5. 3 and 4

6. Animal

7. 5 not 6

EMBASE – Result: 113 studies

1. 'clinical trial'** OR 'controlled trial'** OR 'randomized controlled trial'* OR 'randomised controlled trial'** OR 'randomized'** OR 'randomised'** OR 'trial'** OR 'controlled clinical trial'**

2. 'metabolic syndrome'** OR 'metabolic syndrome x'*

3. 1 and 2

4. 'resisted training'** OR 'resistance training'* OR 'resisted exercise'** OR 'resistance exercise'** OR 'strength training'** OR 'strength exercise'**

5. 3 and 4

6. Animal

7. 5 not 6

THE COCHRANE LIBRARY – Result: 46 studies

1. 'clinical trial'** OR 'controlled trial'** OR 'randomized controlled trial'* OR 'randomised controlled trial'** OR 'randomized'** OR 'randomised'**

OR 'trial'** OR 'controlled clinical trial'**

1. 'metabolic syndrome'** OR 'metabolic syndrome x'*

2. 1 and 2

3. 'resisted training'** OR 'resistance training'* OR 'resisted exercise'** OR 'resistance exercise'** OR 'strength training'** OR 'strength exercise'**

4. 3 and 4

5. Animal

6. 5 not 6

   Filter: "trials".

SPORTDiscus – Result: 15 studies

1. 'clinical trial'** OR 'controlled trial'** OR 'randomized controlled trial'* OR 'randomised controlled trial'** OR 'randomized'** OR 'randomised'** OR 'trial'** OR 'controlled clinical trial'**

2. 'metabolic syndrome'** OR 'metabolic syndrome x'*

3. 1 and 2

4. 'resisted training'** OR 'resistance training'* OR 'resisted exercise'** OR 'resistance exercise'** OR 'strength training'** OR 'strength exercise'**

5. 3 and 4

6. Animal

7. 5 not 6

PEDro – Result: 45 studies

Abstract & Title: metabolic syndrome

Therapy: strength training

Method: clinical trial

*Medical Subject Headings (MeSH); **Keywords.*

Supplementary Table 2. Characteristics of included studies.

Study name	Patient characteristics and sample size	Participants (inclusion/exclusion criteria)	Study length	Interventions	Metabolic syndrome risk factors assessed and time points
Castaneda 2002[24]	n = 62 RT group = 31 Control group = 31 % Female = 64.5% RT group = 67.7% Control group = 61% Age (Mean ± SD) RT group = 66 ± 2 Control group = 66 ± 1	Inclusion: Confirmation of diabetes diagnosis by fasting plasma glucose ≥ 7.0 mmol/l or use of diabetic medications. Exclusion: myocardial infarction (within past 6 months) and any unstable chronic condition, including dementia, alcoholism, dialysis, retinal hemorrhage or detachment, or current participation in resistance training.	3 days p/ week for 16 wks.	RT: 5 exercises; intensity: 60-80% 1RM; dose: 9 S/MG/W; Training sessions: Supervised. Control group: continued usual medical care, received Spanish translated diabetes recommendations for self-management, and were not given dietary counseling.	Triglycerides HDL-C Fasting plasma glucose SBP DBP WC Baseline 16 wks
Dunstan 2002[26]	n = 29 RT group = 16 Control group = 13 %Female = 44.8% RT group = 37,5% Control group = 53,8% Age (Mean ± SD) RT group = 67.6 ± 5.2 Control group = 66.9 ± 5.3	Inclusion: Overweight and sedentary; had established but not optimally controlled type 2 diabetes, were not taking insulin and were nonsmokers. Exclusion: history or physical findings suggestive of ischemic heart disease, systemic diseases, uncontrolled hypertension and advanced diabetic neuropathy or retinopathy.	3 days p/ week for 6 months.	RT: 9 exercises; intensity: 50-85% 1RM; dose: 9 S/MG/W; Training sessions: Supervised. Control group: offered static stretching exercises.	Triglycerides HDL-C Fasting Plasma Glucose SBP DBP WC Baseline 3 months 6 months
Kukkonen-Harjula 2005[27]	N = 68 RT group = 26 Aerobic group = 20	Inclusion: Age 35-50 years, BMI range of 30-40 kg/m^2 and waist circumference over 100 cm.	3 days p/ week for 6 months.	All groups performed a 2-month very-low-energy diet before training programs.	Triglycerides HDL-C Fasting Plasma Glucose

	Control group = 22 All males Age (Mean ± SD) All participants = 42.6 ± 4.6	Exclusion: Regular medication; plenty of physical activity; smokers; resting blood pressure > 160/105 mmHg; fasting serum cholesterol >8 mmol L^1; triglycerides >4 mmol L^1; blood glucose >6.7 mmol L^1.		RT: 6 exercises; intensity: 60-80% 1RM; dose: 9 S/MG/W. AT: 60-70% VO_2 max; dose: 135 min/week. Training sessions: 1 weekly training session was supervised. Control group: advised not to increase physical activity.	SBP DBP WC Baseline 2 months 8 months 31 months
Sigal 2007[28]	n = 251 RT group = 64 Aerobic group = 60 Combined group = 64 Control group = 63 % Female = 36.2% RT group = 37% Aerobic group = 35% Combined group = 37% Control group = 35% Age (Mean ± SD) RT group = 54.7 ± 7.5 Aerobic group = 53.9 ± 6.6	Inclusion: type 2 diabetes for more than 6 months and a baseline hemoglobin A1c value of 6.6% to 9.9%. Exclusion: current insulin therapy; participation in exercise 2 or more times weekly or in any resistance training during the previous 6 months; changes during the previous 2 months in oral hypoglycemic, antihypertensive, or lipid- lowering agents or body weight; serum creatinine level of 200 mmol/L or greater; proteinuria greater than 1 g/d; blood pressure greater than	3 days p/ week for 6 months.	Before randomization, all participants entered a 4-week run-in phase to assess adherence. RT: 7 exercises; intensity: 7-9 RM; dose: 6-9 S/MG/W. AT: 60-75% VO_2 max; dose: 45-135 min/week. Combined group: RT + AT. Training sessions: Individual exercise supervision was	Triglycerides HDL-C SBP DBP WC Baseline 3 months 6 months

				provided weekly for the first 4 weeks after randomization and biweekly thereafter. Control group: asked to revert to pre-study activity levels.	
	Combined group = 53.5 ± 7.3 Control group = 54.8 ± 7.2	160/95 mmHg; restrictions in physical activity because of disease; presence of other medical conditions that made participation inadvisable.			
Stensvold 2010[8]	n = 43 RT group = 11 Aerobic group = 11 Combined group = 10 Control group = 11 % Female = 39.5% Age (Mean ± SD) RT group = 50.9 ± 7.6 Aerobic group = 49.9 ±10.1 Combined group = 52.9 ± 10.4 Control group = 47.3 ± 10.2	Inclusion: Patients with metabolic syndrome according to International Diabetes Federation. Exclusion: unstable angina pectoris, uncompensated heart failure, myocardial infarction during the past 4 wk, complex ventricular arrhythmias, and kidney failure.	Sessions 3 days p/ week for 12 weeks.	RT: 7 exercises; intensity: 60-80% 1RM; dose: 9 S/MG/W. AT: 70-95% HR_{peak}; dose: 129 min/week. Combined group: RT (1x p/wk) + AT (2x p/wk). Training sessions: Supervised. Control group: was instructed not to change their dietary patterns or physical activity levels during the study period.	Triglycerides HDL-C Fasting Plasma Glucose SBP DBP WC Baseline 12 wks
Saremi 2011[10]	n= 21 RT group = 11 Control group = 10 All male Age (Mean ± SD) All participants = 45,25 ±	Inclusion: Males with the metabolic syndrome (based International Diabetes Federation); Low physical activity level (less than 30 minutes of physical activity per day); Aged between 20-60.	Sessions 3 days p/ week for 12 weeks.	RT: intensity: 30-85% 1RM; dose: 6-9 SMG/W. Training sessions: Supervised. Control group: not participate in any regular exercise.	Triglycerides HDL-C Fasting Plasma Glucose WC Baseline 12 wks

	4,3	Exclusion: Cardiovascular disease; Musculoskeletal problems; Receiving any other treatments.			
Venojarvi 2013[11]	n = 144 RT group = 49 Aerobic group = 48 Control group = 47 All males Age (Mean ± SD) RT group = 54 ± 6.1 Aerobic group = 55 ± 6.2 Control group = 54 ± 7.2	Inclusion: age 40-65 years; BMI between 25.1 and 34.9 kg/m^2; and fasting plasma glucose between 5.6 and 6.9 mmol/L. Exclusion: earlier detection of IGT and engagement in prescribed diet or exercise programs, engagements in regular and physically very rigorous activities and usage of medication affecting glucose balance.	Sessions 3x p/ week for 12 weeks.	RT: 50-85% 5RM; dose: 125 min/wk. AT: 55-75% of Heart Rate reserve; dose: 103 min/wk. Training sessions: Supervised. Control group: not participate in any regular exercise.	Triglycerides HDL-C Fasting Plasma Glucose SBP DBP WC Baseline 12 wks
Earnest 2014[7]	n = 262 RT group = 73 Aerobic group = 72 Combined group = 76 Control group = 41 %Female = 62.2% RT group = 59% Aerobic group = 62% Combined group = 64% Control group = 68% Age (Mean ± SD) RT group = 57 ± 9 Aerobic group = 54 ± 9 Combined group = 55 ± 8 Control group = 59 ±8	Inclusion: type 2 diabetes; sedentary (not participating in RT and Aerobic exercise. Exclusion: history of stroke, advanced neuropathy or retinopathy, or other serious medical condition contraindicated for exercise or that may prevent adherence to the study protocol.	Sessions 3 days p/ week for 9 months.	RT: 7 exercises; intensity: 10-12 RM; dose: 6-9 S/MG/W. AT: 65% VO$_{2peak}$; dose: 150 min/wk. Combined group: 2x p/wk of RT and 3-5x p/wk of aerobic training. Training sessions: Supervised. Control group: Offered weekly stretching and relaxation classes.	Triglycerides HDL-C Fasting Plasma Glucose SBP DBP WC Baseline 9 months

RT: Resistance Training; **AT:** Aerobic Training; **RM:** Repetition Maximum; **CHD:** Coronary Heart Disease; **BMI:** Body Mass Index; **HDL-C:** High Density Lipoprotein Cholesterol; **SBP:** Systolic Blood Pressure; **DBP:** Diastolic Blood Pressure; **WC:** Waist Circumference; **IGT:** Impaired Glucose Tolerance; **S/MG/W:** Sets for each muscle group per week; **HR:** Heart rate.

Supplementary Table 3. Risk of bias of included studies (PEDro).

Study	Eligibility criteria specified	Random allocation	Concealed allocation	Groups similar at baseline	Participant blinding	Therapist blinding	Assessor blinding	Adequate follow-up	Intention to treat analysis	Between group comparisons	Point estimates and variability	Total (0-10)
Castaneda 2002	No	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	6
Dunstan 2002	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
Kukkonen-Harjula 2005	Yes	Yes	No	Yes	No	No	No	Yes	No	Yes	Yes	5
Sigal 2007	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	8
Stensvold 2010	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes	6
Saremi 2011	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
Venojarvi 2013	Yes	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4
Earnest 2014	No	Yes	No	Yes	No	No	No	No	No	Yes	Yes	4

Supplementary Table 4. Quality summary of outcome assessment (GRADE).

Outcomes	Quality Assessment			Patient, n		Effect	Quality
	Risk of Bias ‡	Inconsistency §	Imprecision ¶	RT Group	Control Group	MD† (95% CI)	
Fasting Plasma Glucose Seven studies	Serious limitation (-1)	No serious inconsistency	Serious imprecision (-1)	202	168	0.04 (-0.12, 0.20)	Low
HDL-Cholesterol Eight studies	Serious limitation (-1)	No serious inconsistency	No serious imprecision	266	231	-0.00 (-0.05, 0.04)	Moderate
Triglycerides Eight studies	Serious limitation (-1)	No serious inconsistency	No serious imprecision	266	231	0.03 (-0.14, 0.20)	Moderate
Diastolic Blood Pressure Seven studies	Serious limitation (-1)	No serious inconsistency	No serious imprecision	255	221	1.39 (-0.19, 2.98)	Moderate
Systolic Blood Pressure Seven studies	Serious limitation (-1)	No serious inconsistency	No serious imprecision	255	221	4.08 (1.33, 6.82)	Moderate
Waist Circumference Eight studies	Serious limitation (-1)	No serious inconsistency	No serious imprecision	266	231	1.09 (-0.12, 2.30)	Moderate

† Mean Difference (MD) of the resistance training group compared with the control group.

‡ More than 25% of participants from studies with low methodological quality (Physiotherapy Evidence Database (PEDro) score <7 points).

§ Substantial I^2 (>75%).

¶ Fewer than 400 participants for each outcome.