

Appendix Table 1. Characteristics of Included Randomized, Controlled Trials*

Study, Year (Reference)	Patients, <i>n</i>	Study Method [†]	Population Characteristics	
			Source	Duration of Low Back Pain
Acute populations				
Chok et al., 1999 (62)	54	+, ?, +, -	Secondary or tertiary care (referred)	Acute
Delitto et al., 1993 (65)	24	- , ? , ? , -	Secondary or tertiary care (referred)	Acute
Faas et al., 1993 (37)	473	+, +, +, -	Primary care	Acute
Farrell and Twomey, 1982 (68)	48	-, ?, +, +	Unclear	Acute
Gilbert et al., 1985 (69)	187	-, ?, +, -	Primary care	Acute
Hides et al., 1996 (95)	41	+, +, +, -	Secondary or tertiary care (referred)	Acute
Malmivaara et al., 1995 (25)	186	+, +, +, +	Occupational	Acute
Seferlis et al., 1998 (76)	180	-, ?, -, +	Occupational	Acute
Stankovic and Johnell, 1990 (54)	100	+, +, +, ?	Unclear	Acute
Underwood and Morgan, 1998 (80)	75	+, +, +, -	Primary care	Acute
Waterworth and Hunter, 1985 (81)	108	-, -, +, -	Primary care	Acute
Subacute populations				
Cherkin et al., 1998 (35)	321	+, +, +, -	Secondary or tertiary care (referred)	Subacute
Davies et al., 1979 (64)	43	-, ?, +, +	Primary care	Subacute
Lindström et al., 1992 (22)	103	+, +, +, +	Occupational	Subacute [§]
Moffett et al., 1999 (47)	187	+, +, +, -	Primary care	Subacute [§]
Staal et al., 2004 (90)	134	+, +, +, -	Occupational	Subacute
Storheim et al., 2003 (91)	93	+, +, -, -	Occupational	Subacute
Chronic populations				
Alexandre et al., 2001 (56)	33	?, ?, +, ?	Occupational	Chronic
Aure et al., 2003 (32)	49	+, +, +, -	Occupational	Chronic

Appendix Table 1—Continued

Exercise Description	Exercise Intervention Characteristics			Comparison Group
	Intervention Time, h [±]	Delivery Format	Other Interventions	
1) Extensor endurance program: aerobics, stretching, strengthening	13.5	Individual	Advice to stay active or education; passive modality	No treatment
1) Williams flexion exercise regimen with home exercises	7.3	Individual	Manual therapy	
2) McKenzie regimen, plus long-lever manipulation	7.3	Individual	Manual therapy	
1) 8 exercises: "resting position," side bending, stretching, isometric abdominal strengthening	3.3	Individual	Advice to stay active or education; analgesics or NSAIDs	1) Sham treatment
1) Isometric abdominal exercises, ergonomic advice, home abdominal exercises	2.7	Individual; independent home exercises	Advice to stay active or education; passive modality	2) Usual general practitioner care Other conservative treatment
1) Adapted Kendall flexion routine (home program), education, plus analgesics	4.8	Independent home exercises	Advice to stay active or education; analgesics or NSAIDs	1) Usual general practitioner care
2) Exercise, education, plus bed rest for 4 d	4.8	Independent home exercises	Education; bed rest	2) Other conservative treatment
1) Multifidus isometric retraining	NA	NA	Advice to stay active or education; analgesics or NSAIDs	Usual general practitioner care
1) Flexibility or mobilizing exercises: back extension, lateral bending movements	10	Independent home exercises	Advice to stay active or education; analgesics or NSAIDs	1) No treatment 2) Other conservative treatment
1) Intensive training program: information, muscle training, and general conditioning	130.5	Group	Advice to stay active or education	1) Other conservative 2) Usual general practitioner care treatment
1) McKenzie analysis and exercises	2	Individual; independent home exercises	Advice to stay active or education	No treatment
1) Education on McKenzie principles, teaching extension exercises, plus general advice	1.8	Group	Advice to stay active or education; analgesics or NSAIDs	Usual general practitioner care
1) Conservative physiotherapy including active flexion and extension exercises	6.3	Individual	Advice to stay active or education	1) Other conservative treatment 2) Other conservative treatment
1) McKenzie exercise program (trained physiotherapists, centralize symptoms)	7.3	Individual	Advice to stay active or education	1) No treatment
1) Extension exercises ("prone, raising trunk" described as back-muscle strengthening)	9.6	Individual	Passive modality	Other conservative treatment
2) Flexion exercises (described as "mobilizing")	9.6	Individual	Passive modality	
1) Individual graded-activity program (quota-based): endurance, strengthening, aerobics	133	Individual; independent home exercises	Advice to stay active or education; back school	Usual general practitioner care
1) Aerobics, strengthening, stretching	8	Group	Behavioral therapy; advice to stay active or education	Usual general practitioner care
1) Graded-activity program	13	Individual	Advice to stay active or education	Usual general practitioner care
1) Intensive training program: aerobic, strength, flexibility	31	Group	None	1) Other conservative treatment 2) Usual general practitioner care
1) Several components: exercise, plus home exercises	24	Group	Advice to stay active or education	No treatment
1) Stretching exercises (2 of 3); passive manipulation (1 of 3)	10	Individual; independent home exercises	Manual therapy; analgesics or NSAIDs	
2) Individually designed: strengthening, stretching, mobilizing, coordination, and stabilizing exercises for abdomen, back, pelvis, and lower limb; equipment	10	Individual; independent home exercises	Analgesics or NSAIDs	

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Appendix Table 1—Continued

Study, Year (Reference)	Patients, <i>n</i>	Study Method [†]	Population Characteristics	
			Source	Duration of Low Back Pain
Bendix et al., 2000 (60)	138	?, ?, -, -	Occupational	Chronic
Bendix et al., 1995 (57)	106	+, ?, -, -	Secondary or tertiary care (referred)	Chronic
Bentsen et al., 1997 (33)	74	+, +, +, -	General population	Chronic [§]
Bronfort et al., 1996 (34)	103	+, +, -, +	General population	Chronic
Buswell, 1982 (61)	50	-, ?, -, -	Primary care	Chronic [§]
Calmels et al., 2004 (83)	17	?, ?, +, -	Secondary or tertiary care (referred)	Chronic
Dalichau and Scheele, 2000 (63)	63	?, ?, +, -	Secondary or tertiary care (referred)	Chronic
Descarreaux et al., 2002 (66)	20	+, -, +, -	General population	Chronic [§]
Deyo et al., 1990 (18)	125	+, +, +, +	General population	Chronic
Elnaggar et al., 1991 (36)	56	+, +, -, +	Secondary or tertiary care (referred)	Chronic
Frost et al., 1995 (19)	71	+, +, +, +	Primary care	Chronic
Frost et al., 2004 (84)	286	+, +, -, -	Secondary or tertiary care (referred)	Chronic [§]
Galantino et al., 2004 (85)	22	+, ?, -, -	Mixed	Chronic
Gur et al., 2003 (86)	75	?, ?, +, -	Secondary or tertiary care (referred)	Chronic
Hansen et al., 1993 (21)	180	+, +, +, +	Mixed	Chronic [§]
Hemmilä et al., 1997 (40)	114	-, +, +, +	Mixed	Chronic
Hildebrandt et al., 2000 (43)	222	+, +, -, -	Primary care	Chronic

Appendix Table 1—Continued

Exercise Description	Exercise Intervention Characteristics			Comparison Group
	Intervention Time, h [±]	Delivery Format	Other Interventions	
1) Aerobics and strengthening (machines)	36	Group	None	
2) Functional restoration; comprehensive multidisciplinary approach including aerobics, strengthening, stretching	36	Group	Behavioral therapy; back school	
1) Functional restoration; comprehensive multidisciplinary approach including aerobics, strengthening, stretching	24	Group	Behavioral therapy; back school	Other conservative treatment
2) Aerobics and strengthening	24	Group	Back school	
1) Dynamic strength back exercises: at gym and home	21.8	Individual; independent home exercises	None	
2) Home exercises	21.8	Independent home exercises only	None	
1) Dynamic trunk (Manniche) and abdominal strengthening	20	Individual	Manual therapy	Other conservative treatment
2) Same exercise plus NSAIDs	20	Individual	Analgesics or NSAIDs	
1) Extension exercise program (cites McKenzie)	11	Individual	Manual therapy; advice to stay active or education	
2) Flexion program (mobilizing exercises plus posture)	11	Individual	Manual therapy; advice to stay active or education	
1) Isokinetic strengthening exercises (Cybex [Medway, Massachusetts] machines)	4.5	Individual	Manual therapy	
2) Physiotherapy exercises: series of 3 groups of exercises (whole body)	4.5	Individual	None	
1) Strengthening: warm-up aerobic exercises, 60-min equipment training (total body)	12	Individual	Lumbar support	No treatment
2) Same as above with no lumbar support during exercises	12	Individual	None	
1) Standard stretching or strengthening program	18.3	Independent home exercises	None	
2) Force, extensibility exercises of trunk and hip muscles based on initial evaluation; targeted increased	18.3	Supervised home exercises	None	
1) 12 sequential relaxation and stretching exercises (improve flexibility); exercises plus TENS	10.6	Supervised home exercises	Advice to stay active or education; passive modality	Other conservative treatment
1) Extension exercises ("prone, raising trunk" described as back-muscle strengthening)	7	Supervised home exercises	None	
2) Flexion exercises (described as "mobilizing")	7	Supervised home exercises	None	
1) Warm-up, stretching, progressive exercises, light aerobic and advice, plus back school	8	Group	Advice to stay active or education; back school	Other conservative treatment
1) Standard physiotherapy: 94% received exercises (stretching, strengthening, mobility exercises)	3.5	Individual	Manual therapy; advice to stay active or education	Other conservative treatment
1) Hatha yoga: sequence of postures that leads to a state of relaxation (strength, flexibility, balance)	19.5	Group; independent home exercises	None	No treatment
1) Stretching and strengthening exercises of lumbar and extremity muscle groups	5	Independent home exercises	None	Other conservative treatment
2) Same exercises as above with additional intervention	5	Independent home exercises	Low-power laser therapy	
1) Intensive dynamic back-muscle training: extension strengthening	8	Individual	None	1) Other conservative treatment 2) Other conservative treatment
1) Bending, rotation exercises; "auto-stretching when appropriate"	13.8	Independent home exercises	None	1) Other conservative treatment 2) Other conservative treatment
1) Postural exercises (Cesar therapy)	10.5	Individual	None	Usual general practitioner care

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Appendix Table 1—Continued

Study, Year (Reference)	Patients, <i>n</i>	Study Method [†]	Population Characteristics	
			Source	Duration of Low Back Pain
Johannsen et al., 1995 (70)	27	–, ?, –, –	Secondary or tertiary care (referred)	Chronic
Jousset et al., 2004 (87)	85	+, ?, +, –	Occupational	Chronic
Kankaanpää et al., 1999 (44)	54	+, +, +, –	Occupational	Chronic
Kendall and Jenkins, 1968 (71)	42	–, ?, +, –	Primary care	Chronic
Kuukkanen and Mälikä, 2000 (72)	57	?, ?, +, –	Occupational	Chronic [§]
Lidström and Zachrisson, 1970 (73)	62	–, ?, +, ?	Secondary or tertiary care (referred)	Chronic [§]
Lie and Frey, 1999 (74)	27	+, ?, –, +	Primary care	Chronic
Manniche et al., 1988 (26)	105	+, +, +, +	Secondary or tertiary care (referred)	Chronic
Mannion et al., 1999 (29)	148	+, +, +, +	General population	Chronic
Moseley, 2002 (48)	57	+, +, –, –	Primary care	Chronic
Niemistö et al., 2003 (88)	204	+, +, +, –	General population	Chronic
Petersen et al., 2002 (49)	260	+, +, –, +	Secondary or tertiary care (referred)	Chronic
Preyde, 2000 (50)	98	+, –, +, +	Mixed	Chronic [§]
Rasmussen-Barr et al., 2003 (89)	47	?, ?, –, –	Primary care	Chronic [§]
Risch et al., 1993 (75)	54	–, –, +, –	Secondary or tertiary care (referred)	Chronic

Appendix Table 1—Continued

Exercise Description	Exercise Intervention Characteristics			Comparison Group
	Intervention Time, h [±]	Delivery Format	Other Interventions	
1) Aerobics, exercises emphasizing coordination, balance, stability, stretching	24	Group	None	
2) Aerobics, dynamic exercises emphasizing muscle endurance: abdominal, shoulder, hip muscle stretching	24	Group	None	
1) Functional restoration	150	Group	None	
2) Active individual therapy (strengthening, stretching, aerobics recommended)	19	Individual; independent home exercises	Advice to stay active or education	
1) Strengthening (machines) with stretching, coordination (David Beck Clinic program)	36	Group	Behavioral therapy; advice to stay active or education	Other conservative treatment
1) Mobilizing, strengthening, posture	7.9	Independent home exercises	Advice to stay active or education	
2) Isometric flexion exercises: strengthening abdominal and trunk muscles (2 exercises)	7.9	Independent home exercises	Advice to stay active or education	
3) Strengthening extension muscles, posture, lifting	7.9	Independent home exercises	Advice to stay active or education	
1) Strengthening, endurance, balance and coordination	21	Independent home exercises only	None	No treatment
1) Mobilizing (kneeling and supine) and strengthening (isotonic abdominal and back) exercises and home exercises	4.8	Individual; independent home exercises	Passive modality	1) Other conservative treatment 2) Other conservative treatment
1) Mobilizing and stretching, walking in "flexible way"	15	Group; independent home exercises	None	
2) Stabilizing exercises and walking without instructions	15	Group; independent home exercises	None	
1) Intensive strengthening: trunk, back strengthening routine	45	Individual	None	
2) Back strengthening routine; similar to group 1, lower dose	45	Individual	None	
3) Isometric exercises for lower back	45	Individual	Manual therapy; passive modality	
1) Aerobics, stretching	24	Group	None	
2) Controlled progressive exercises with machines (David Beck Clinic program)	24	Group	None	
3) Physiotherapy including exercises using resistance bands and general strength training	17.6	Individual	Ergonomic advice; passive modality	
1) Specific trunk muscle training: individualized with home exercise program (Richardson and Jull)	12	Individual; independent home exercises	Manual therapy; advice to stay active or education	Usual general practitioner care
1) Stabilizing exercises aiming to correct lumbopelvic rhythm	4	Individual; independent home exercises	Manual therapy; advice to stay active or education	Usual general practitioner care
1) Strengthening training: stationary bike, intensive dynamic back strengthening in flexion and extension	6.9	Group	None	
2) McKenzie therapy	6.9	Individual	None	
1) Stretching, flexion or extension, "general strengthening or mobility"	2	Individual	Manual therapy	1) Sham treatment
2) Comprehensive massage (massage and exercises)	2	Individual	Advice to stay active or education	2) Other conservative treatment
1) Stabilizing exercises: activation and control deep abdominal, multifidus muscles	7	Individual; supervised home exercises	Advice to stay active or education	Other conservative treatment
1) Dynamic extension strengthening program (machine)	11.4	Individual	None	No treatment

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Appendix Table 1—Continued

Study, Year (Reference)	Patients, <i>n</i>	Study Method [†]	Population Characteristics	
			Source	Duration of Low Back Pain
Rittweger et al., 2002 (51)	60	+, +, +, -	General population	Chronic
Lønn et al., 1999 (46); Soukup et al., 1999 (52)	120	+, +, +, -	Mixed	Chronic [§]
Torstensen et al., 1998 (31)	208	+, +, +, +	Occupational	Chronic
Tritilanunt and Wajanavisit, 2001 (78)	72	+, ?, +, -	Secondary or tertiary care (referred)	Chronic
Turner et al., 1990 (79)	96	+, +, -, -	Mixed	Chronic
Yelland et al., 2004 (92)	110	+, +, +, -	Mixed	Chronic
Yeung et al., 2003 (93)	52	?, +, +, -	Primary care	Chronic
Yozbatiran et al., 2004 (94)	30	?, ?, +, -	Secondary or tertiary care (referred)	Chronic
Zylbergold and Piper, 1981 (82)	28	-, ?, +, -	Primary care	Chronic [§]
Unclear population				
Ljunggren et al., 1997 (45)	126	+, +, +, -	Primary care	Unclear

* 61 studies were included: 11, 6, and 43 in acute, subacute, and chronic low back pain populations, respectively (1 unclear). + = yes; - = no; ? = unknown; NA = not applicable; NSAIDs = nonsteroidal anti-inflammatory drugs; TENS = transcutaneous electrical nerve stimulation.

[†] Study method factors: adequate randomization, allocation concealment, adequate follow-up, outcome assessor blinding.

[‡] Intervention time calculated as “best estimate” when a home exercise program was used and study adherence information was not available (see text).

[§] Sensitivity analysis as “mixed” population.

|| Galantino et al. (85) was excluded from quantitative syntheses because of flaw: small study with >50% loss to follow-up.

Appendix Table 1—Continued

Exercise Description	Exercise Intervention Characteristics			Comparison Group
	Intervention Time, h [±]	Delivery Format	Other Interventions	
1) Lumbar extension, repetitive contraction cycles, constant speed, load gradually increased; resistance exercise of the abdominal and thigh muscles	3	Individual	None	
2) Specific exercise: "platform that oscillates around a resting axis between the subject's feet ... during exercise units, the subject performed slow movements of the hip and waist, with bending in the sagittal and frontal planes and rotation in the horizontal plane"	3	Individual	None	
1) Mensendiek exercise: aerobic, stretching, strength, coordination, and ergonomic education	20	Group	None	No treatment
2) Active back school, 30-min exercise session	20	Group	Back school	
1) Ordinary activity level: walking exercise program	36	Independent home exercises	None	Other conservative treatment
2) Medical exercise therapy: mobilizing and strengthening with special equipment; aerobic exercise warm-up	36	Group	None	
1) Aerobic exercises	NA	NA	Advice to stay active or education	
2) Flexion exercises, posture, and behavioral therapy	NA	NA	Advice to stay active or education	
1) Increasing aerobic fitness (fast walking, slow jogging); warm-up, cooldown stretching	16	Group	None	1) No treatment
2) Behavioral and exercise therapy: same as exercise plus behavioral therapy (with spousal participation)	16	Group	Behavioral therapy	2) Other conservative treatment
1) Sagittal loading flexibility or mobilizing exercises	12	Independent home exercises	Passive modality	Other conservative treatment
1) Stretching, mobilizing, strengthening exercises	7.5	Group; independent home exercises	Advice to stay active or education	
2) Stretching, mobilizing, strengthening exercises plus electroacupuncture	7.5	Group; independent home exercises	Passive modality; advice to stay active or education	
1) Warm-up, stretching, progressive exercises, light aerobics on land	8	Group	None	
2) Warm-up, stretching, progressive exercises, light aerobics in water	8	Group	None	
1) Flexion exercises	3.5	Individual	Passive modality	1) No treatment 2) Other conservative treatment
1) Terapi Master (Nordisk Terapi, Arendal, Norway) device for general exercise: strengthening, stretching	39	Supervised home exercises	None	
2) Conventional physical therapy exercises: low-tech strengthening, stretching	39	Supervised home exercises	None	