

Traction for low-back pain

Table 1. Characteristics of Included Studies

Study	Participants	Interventions	Outcome Measures	Conclusions
Beurskens 1997 ⁽¹³⁾	151 patients Gender: 85 M, 66 F. Age: >18 yrs old Symptoms: at least 6 wks sub-acute and chronic nonspecific LBP Recruited by physiotherapists and general practitioners in the Netherlands	T) Continuous mechanical traction with Eltrac, DIMEC Delft Instruments, the Netherlands. Force increased until patient tolerance reached; minimum force 35% and maximum 50% of body weight C) Sham traction, same as above except force increased until patient felt a little pulling; maximum force 20% of body weight. Brace around iliac crest became tighter during treatment. Both groups had 20-minute sessions, x12 in 5 weeks.	Global perceived effect First/Second main complaint Function (RDQ) Pain at the moment Severity of LBP Work absence Outcomes at 12 weeks, 6 months	No statistically significant differences on any outcome measures.
Bihaug 1978 ⁽¹⁶⁾	42 patients Gender: 23 M, 19 F. Age: 19-71 (Mean 44.1 yrs) Symptoms: All had radicular pain; in 32 radiating pain was below the knee. Pain duration 3 to 52 weeks (mean 9.7 weeks). 25 patients on sick-leave at baseline (1-24 weeks, mean 5.1). 18 had severe pain, the remainder had moderate pain. 27 had neurological deficits Referred from secondary care setting	T) Autotraction, using a combination of Lind's and Myrin's method. Patients pushing with one or both arms (according to Myrin/Spina-Trac). 4-12 sessions (average 8.2), with 3.1 day interval between sessions. Force 70 kiloponds. All patients received back education. C) Isometric exercises of the abdominal and pelvic floor muscles, to increase abdominal pressure/intrinsic lumbar support). 4-12 sessions (average 10.6) with 4.1 day interval between sessions).	Global improvement at the end of treatment series; 1 month after treatment; 3 months after treatment Outcomes at 1 & 3 months post-treatment	Statistically significant advantage for autotraction group post-treatment (but not at 1 or 3 months)
Borman 2003 ⁽³⁰⁾	42 patients Gender: 14 M, 28 F. Age: T) 38.5 +/- 8.4; C) 42.8 +/- 10.5. Symptoms: persistent (>6 months) and/or recurring, nonspecific LBP, Duration of pain (months): T) 27 +/- 19.5; C) 34.09 +/- 14.1. Ratio of patients with/without radiation: T) 14:7; C) 13:8. Outpatients in physical medicine and rehabilitation department of large hospital.	T) Traction and standard physiotherapy. Motorized traction (Eltrac 439, Enraf, Holland), ten 20-min sessions, patients lying on traction table in semifowler position. Canvas braces attached around iliac crest and lower thoracic region, with force increased to maximum of 50% body weight. Traction applied between ultrasound therapy and exercise sessions in standard physiotherapy program (as below). C) Standard physiotherapy only. Included hot packs (10 min), ultrasound (10 min), exercise (20 min).	Pain (VAS) Function (ODI) Global improvement Outcomes post-treatment and at 3 months	No statistically significant differences between treatment groups. Also, no differences in outcomes for patients with and without radiation (p>0.05).
Coxhead 1981 ⁽¹⁷⁾	334 patients Gender: 185 M, 149 F. Age: Mean 41.9 yrs Symptoms: Average duration of symptoms 14.3 weeks. Sciatic pain at least as far as the buttock crease, with/without back pain. Pain not due to malignant or infective disease, gynaecological disorders, sacroiliac disease, vertebral collapse, or gross structural abnormality. Referred to the outpatient department	Random assignment to combinations of four treatments: T) Intermittent (Tru-Trac) traction, at pre-set forces and time-intervals. Duration and intensity at therapist's discretion. C1) Exercises which brought in all ranges of motion and muscle groups C2. Manipulation by Maitland technique C3. Corset - a ready-made fabric lumbar support. All patients received short-wave diathermy and a standardized half-hour "back school" lecture. For all interventions, patients treated daily for first week, with decreasing frequency in the	Patient assessments Pain (VAS) Return to work Outcomes after 4 weeks	Pain at 4 wks: Statistically significant difference favour C2. Patient assessments at 4 wks: significant trend in favour of an increasing number of types of treatment (not specific types of treatment) No long-term benefits of any treatment or combination of treatments.

Traction for low-back pain

		following three weeks.		
Konrad 1992 ⁽³¹⁾	170 patients Gender: 75 M, 95 F. Age: Mean 41.5 yrs Symptoms: Non-specific back pain localised to the lumbosacral region, with or without radiation to the thigh. Duration of pain at least 1 mo, but no longer than three months. A pain free year before onset of the current episode. Recruited from three factories	T) Underwater traction. Patient fixed perpendicularly in special deep pool, bar grasped under the arms and traction applied. C1) Balneo-therapy. Patients immersed in thermal water with minerals. C2) Underwater massage. Same water, with massage and movement while a stream of hot water (37 deg C) played on the affected part. C3) Control group (no treatment) All treatments done for 15 minutes, 3x/week for 4 weeks. All patients received back education. Only NSAIDS offered to control pain	Number of analgesics taken Pain Intensity (100mmVAS) Outcomes after 4 weeks, 1 year	Analgesics taken: At one month, statistically significant difference in all treatment groups compared to control (p<0.01). No significant difference between the treatment groups. Pain intensity: At one month, statistically significant pain reduction in all treatment groups (p<0.01). No significant difference in control group At 1 year, no difference between groups. Reduction in analgesic consumption well maintained in treatment groups
Larsson 1980 ⁽¹⁸⁾	82 patients Gender: 51 M, 31 F. Age: 20-55 yrs Symptoms: Lumbago-sciatica with or without symptoms of neurological deficit. Duration of current episode at least 2 wks and not more than 3.5 mos., positive SLR test. Recruited in 6 departments of orthopaedic surgery	T) Autotraction: up to 3x/week, as per Lind (1974). Pelvis fixed to the foot end of bench, patient grasps bars at end and performs traction himself by pulling his arms. Pt. supplied with reinforced, high, fabric corset and special pillow. Sessions < 1 hr. Out-pats usually taken home by ambulance. Patients confined to bed for first few days, then mobilized gradually in corset. C) Corset of same type as traction group and same instructions with respect to rest. Standard analgesics (Paracetamol) prescribed when required for both groups.	Recovery from pain (completely recovered; completely recovered or free from pain in leg; completely recovered or free from pain in leg or back) Outcomes after 1 week, 3 weeks, 3 months	At 1 week, statistically significant differences favouring autotraction, in all recovery categories. At 3 weeks, significant difference remains for those "completely recovered or free from pain in leg" and "completely recovered or free from pain in leg or back".
Letchuman 1993 ⁽³²⁾	26 subjects Gender: 16 M, 10 F. Age: 26-65 yrs Symptoms: LBP with/without lower extremity pain and neurological signs. Cough, sneeze or deep breath does not cause severe pain, radiographs, MRI or CT scan of lumbar spine taken within past 6 mo. Referred from physicians	T1) Static (mechanical traction), continuous traction force (after sham treatment) for a 6 min period at magnitude of 50% bodyweight. T2) Intermittent traction, for a 6 min period (after sham treatment), with a 10-second hold period at a magnitude of 50% bodyweight, followed by a 10-second rest period. One session of traction appears to have been given in each case.	Pain intensity (VAS) measured prior to, and 2-3 minutes after traction Outcomes post-treatment	Decreased Pain: T1) 7 of 13 patients; T2) 8 of 13 patients. Increased Pain: T1) 4 of 13 patients; T2) 2 of 13 patients. Focus of study is myoelectric activity for traction.
Lidström 1970 ⁽¹⁹⁾	62 patients Gender: 29 M, 33 F. Age: 21 to 61 yrs. Symptoms: LBP and sciatica radiating down one leg, of more than one month's duration. 32 patients had a history of pain > 1 year. Patients strongly suspicious of the presence of a disc prolapse were not accepted. Selected from an orthopedic outpatient clinic	T) Intermittent pelvic traction with a Tru-Trac traction table for 20 min with 4 sec hold intervals and a 2 sec rest. Traction force was correlated to the patient's weight according to the given figures. Instruction on Fowler position, strengthening exercises, regimental dispositions, everyday at home. C1) Conventional treatment, hot packs for 15 min, massage and mobilizing exercises. C2) Control, hot packs for a length of time corresponding with the average for the other methods of treatment.	Patient's opinion of noticeable improvement, at completion of treatment. Outcomes after 3 weeks	Traction appears to have reduced the subjective symptoms of the patients to a higher degree than the other methods.
Lind 1974 ⁽²⁰⁾	45 patients Gender: 29 M, 16 F. Age: 30-50, Mean 34.0 yrs. Symptoms: All had several periods of attack, mean no.	T) Auto-traction followed initially by bed rest, correction of statico-dynamic disorders and advice on spinal hygiene. No PT or medicine. 1 patient	Disappearance of pain in LB/legs without coughing/sneezing Disappearance of pain LB/legs on coughing/sneezing Pain, mean distance radiated	Although no final conclusions from author, we assume positive conclusion, from extraordinarily positive

Traction for low-back pain

	<p>3.5. Pts with serious disorders (e.g. arteriosclerosis, hypertension) excluded. Recruited from wait list of orthopaedic surgery dept.</p>	<p>given cotton corset. Mean # of treatments, approx. 1 hour long, over 1-3 weeks: 3.7. C1) Physiotherapy, with therapist choosing individual treatment, including drugs. 12/15 patients received Tru-Trac traction; other treatments included isometric muscle training, ergonomic instruction, shortwave therapy, heat, cycle machine, bath, manipulation. C2) Bed rest and analgesics, sham short-wave.</p>	<p>Patients' own evaluation at 3 weeks Recovery Outcomes post-treatment</p>	<p>results reported. This is an underpowered study; would need replication.</p>
<p>Ljunggren 1984⁽²²⁾</p>	<p>49 hospitalized patients Gender: 32 M, 17 F. Age: 17-67, Mean 39 yrs Symptoms: Lumbago-sciatica, and considered for surgery. Manifest radicular signs and symptoms of affliction of L5 and/or S1 nerve roots; radiculographical findings indicating disc prolapse, i.e. indentation of the anterior dural surface and unilaterally shortened or widened nerve root sleeve; positive Lasègue's signs; symptoms aggravated or unchanged in last 2-4 weeks; no previous lumbar spine surgery. Level of herniation (n): L4-L5 A 7, M12; L5-S1 A19, M11; Paravertebral pressure test: Positive A 22, M 10, Negative A 4, M13; Duration since first episode of sciatica (weeks) Median A 88, M 20; 95% CI A 18-190, M 9-46.</p>	<p>T1) Autotraction (Lind's method): Multiplane table with 2 sections. Pelvis fixed to foot end of bench, setting of belt and fixation of chain allowing 3-dimensional variation of force. Patient generated/regulated traction force, dragging by arms and pressing by legs. Position of patient and direction of force chosen re clinical examination and response to treatment. Force between 1/3 and 1/1 body weight; each pull kept for some seconds and up to 2 minutes. Treatment sessions approx 1 hr. T2) Manual Traction: Patient supine on ordinary plinth with variable degree of hip/knee flexion. Therapist used straps, altered magnitude/direction of pull by shifting body weight. Traction force in belt scarcely reached 300 N. Static traction x2, each pull lasting 5 minutes. All patients confined to bed, and received back instruction. 3-7 treatments over 1 week.</p>	<p>Overall assessment by neurologist Back Pain Outcomes post-treatment, after 4 weeks</p>	<p>Pain levels different at baseline for two groups.</p>
<p>Ljunggren 1992⁽²¹⁾</p>	<p>50 patients Gender: 27 M, 23 F. Age: 16-62 yrs. Symptoms: Radiating pain, neurological symptoms and signs confirmed by a myelogram. Patients with previous spinal surgery, spondylolisthesis, and root entrapment were excluded. Mean duration of symptoms for 4.8 months (males), 5.3 months. (females). Admitted to the Department of Neurology</p>	<p>T) Continuous manual (static) traction. Therapist leaned gently leaning backwards against a belt around back or hips, and attached below the knees of the patient. Force reached approx 300N. Repeated relief of pain was guiding factor; 1x/day for 10 min (in a few cases 2x/day for 5 min). C) Isometric exercises for the abdominal, back, hip and thigh muscles. Education about importance of these muscles. Contractions 6-8 sec, repeated 5-10 times, daily session approx 20min. Following treatment, patients instructed to lie in the most comfortable positions for two hours. Treatment lasted 5-7 days..</p>	<p>Pain alleviation (VAS) Pain-free or improved Outcomes post-treatment</p>	<p>No significant difference between the two treatment groups found. Four patients of each group deteriorated temporarily in connection with the treatment given.</p>
<p>Mathews 1975⁽²³⁾</p>	<p>27 patients Gender: 9 F and 18 M. Age: 20-60 yrs. Symptoms: Sciatica or cruralgia of at least 3 wks duration with or without back pain. Back movement limited in at least one direction and either the sciatic or femoral nerve stretch test positive. Exclusion: Recently</p>	<p>T) Traction on a plain couch using a force of at least 36.3 kg applied through a pelvic harness, the trunk being restrained by a thoracic harness; 30min a day, 5 days a week, 3 weeks. C) Sham traction; same routine as above except the traction did not exceed 9.1 kg.</p>	<p>Average improvement in pain (VAS) Outcomes post-treatment</p>	<p>Groups differences not statistically significant.</p>

Traction for low-back pain

	acquired neurological deficit, psychological disturbance, pregnancy, radiological evidence of sacro-iliitis or osteoporosis, previous traction			
Mathews 1988 ⁽¹⁵⁾	143 patients Gender: 63 F, 80 M. Age: 20-60 yrs. Symptoms: LBP, local tenderness, asymmetrical restriction of movement, limited straight leg raise and root pain with in the past 3 mos. Referred from a rheumatology clinic or general practitioner	T) Continuous autotraction at level required to relieve pain (usually approx 45 kg), for 30min, 5 days a week, until pain was relieved, but for a maximum of 3 weeks. C) Infra-red heat treatment to the low back area at 60 cm for 15 min, 3x/wk	Patients' assessment of pain (6 pt scale) Outcomes after 10-18 days, 1 year	Statistically significant difference in favour of traction on 8 th day. Data inconsistent between text and graph.
Pal 1986 ⁽²⁴⁾	39 patients Gender: 23 M, 16 F. Age: Mean 38, 39 yrs respectively Symptoms: BP and sciatica, mean duration 42 days for treatment group, and 56 days for sham group. Admitted to hospital	T) Continuous mechanical traction of 5.5-8.2 kgs according to body weight. 2-6 weeks. C) Sham traction (continuous mechanical) of 1.4-1.8 kgs. 2-6 weeks. Both methods were applied by means of a pelvic harness pulled by metal weights over a pulley with the patient supine on a tilted bed.	Pain score (VAS) Return to work Pain after 1, 3 weeks; return to work after 1 year.	Statistically significant reductions in pain in both groups; no between-group differences..
Reust 1988 ⁽²⁵⁾	60 patients Gender: 35 M, 25 F Age: Mean 50.83 yrs. Symptoms: hospitalized for back pain, with or without neurological deficits. Exclusion criteria: previous traction, fast progressing neurological deficit, behavioral problems, or bone ailments that may have caused the back pain. Duration of back pain unknown. Patients hospitalized for lumbo-sciatic problems	T1) Continuous mechanical traction on Eltrac 439. 5 kgs force on day one, increasing 5 kgs each day up to a max of 50 kgs. 10 min/day, 12 sessions, 12 days. Patients also received medication, 20 min lumbar 'parafango' per day, 20 min massage per day, and strict bed rest. T2) Same as above, except traction force of up to max 15 kgs. C) Same as above, except traction force to max 5kgs.	Pain (VAS) Outcome after 2 weeks	No significant difference between groups.
Sherry 2001 ⁽²⁶⁾	44 patients. Gender: T) 11 M, 11 F. C) 12 M, 10 F; Age: (Mean/ Range) T) 41/27-57; C) 43/27-55 yrs; Symptoms: pain of >3 months duration, associated leg pain and confirmed disc protrusion or herniation on CT scan or MRI. Chronicity (mean /range years) T) 8.4/0.25-30; C) 6.2/0.5-28, Recruited through advertisements in local newspapers	T) VAX-D: patient grasps handgrips with arms extended above head; pelvic harness connected to tensionometer, which provides feedback to programmed logic control and operating system; tension applied from baseline tension to therapeutic range of 50-95 lbs, with sessions 30 minutes long, comprising 15 cycles of decompression and relaxation. Five sessions/week over four weeks, then once/week for four weeks. C) TENS treatment 30 minutes daily for 20 days, then x1/week for 4 weeks. TENS treatment considered a placebo by study's authors	Pain (VAS) Disability (4-point self-rating scale) Outcomes post-treatment and at 6 months	Statistically significant group differences in favour of traction.
Sweetman 1993 ⁽²⁷⁾	400 patients Gender: 200 M, 200 F Symptoms: LBP for >1 week Recruited from out-patient rheumatology clinic	T) Continuous mechanical traction, constant pull (10min), 1st week 1/3 body weight, 2 nd week 1/2 body weight, x3/wk. C1) Short wave diathermy, 20 min, 3 times a week, 2 weeks. C2) Sham short wave diathermy, once patient felt heat, output was turned down to minimum, 20 min, x3/week, for 2 weeks. C3) Extension exercises, hump and hollow, alternate leg raise, alternate arm raise, opposite	Overall effect (patient's opinion) at 2 weeks	No statistically significant difference

Traction for low-back pain

		leg and arm raise. Bridging (crouch lying), alternate leg raise, clasp hands behind head and shoulder, and both leg raise, head and shoulder raise, x3/week, 2 weeks.		
Tesio 1993 ⁽³³⁾	44 patients Gender: 25 M; 19 F. Age 23-63 yrs. Symptoms: LBP with or without radiation, duration >1mos, herniation or protrusion, failure of one or more conservative approaches. Excluded: neoplastic, inflammatory or metabolic causes of back pain, or indication for urgent surgery. Referred from an outpatient service of a rehabilitation unit in a large teaching hospital	T1) Intermittent autotraction, patient provides traction force by pulling vigorously on the bar at the head of the table for a period of 3 to 6 seconds, 1 min rest, 30-60 min session, every 2 nd or 3 rd day, total 3-10 sessions. If the patient reported benefit, the treatment was continued for 3 - 6 more sessions until no further improvement. T2) Passive traction. Traction force was adjusted approximately every 10 min, 35% of body weight, 45 min, daily for 5-10 sessions.	Improvement after treatment Pain (VAS) Function (ODI) Cross-over design: Non-responders to either treatment were crossed-over to the other modality after a delay of 4 to 5 days. Outcomes post-treatment	Statistically significant differences in favour of T1 reported on global improvement. Other results (pain, function) reported for only responders.
van der Heijden 1995 ⁽¹⁴⁾	25 participants Gender: 13 M; 12 F. Age: Mean(SD) T) 46(8); C) 47(8) yrs. Symptoms: LBP, mean duration T)18% <6 mo, 82% >24 mo; C) 17% <6 mo, 83% >24 mo. Severity: mean(SD) on Pain VAS T) 47(27), C) 37(23). Radiation: T) 73% , C) 58%. Recruited from hospital setting	T: Continuous traction. . Force slowly increased from 30% of body weight until patient indicated a distinct but tolerable pulling; maximum force 30-50% of body weight. C: Force slowly increased from zero until patient indicated a little pulling. Maximal force 25% of body weight. For both groups: 10-12 sessions during four consecutive weeks; also received leaflet about LBP and ADL.	Pain (VAS) at 5 weeks, 9 weeks Global improvement/recovery at 5 wks, 9 weeks	Group differences in favour of T do not reach statistical significance.
Walker 1982 ⁽²⁸⁾	29 patients Gender: 18 M; 11 F Age: Mean T) 37.8; C) 7.3 yrs. Symptoms: Non-specific LBP and radiating pain, of mixed duration (18 subjects >12 weeks; 11 subjects <12 weeks). Chosen by a specialist in neurology	T) Autotraction: Spina-Trac according to Myrin; 20 minutes daily with 2 hours rest afterwards, for 4-8 days. 40-70 kiloponds force. Other: "traditional regimen for sciatica.; one week's strict bed-rest, back school, unspecified analgesics when needed (but never in morning before treatment sessions). C): Same as (T) except that forces greater than 10 kiloponds not possible.	Pain Follow-up timing not reported	No statistically significant group differences on any measures.
Weber 1973 ⁽²⁹⁾	72 patients Gender: 42 M, 32 F. Age: 85% were 30-60 yrs old. Symptoms: Radiating pains and neurological signs corresponding to a lesion in the L5 and/or S1 root, positive radiculogram. Duration unknown. Excluded: bladder paresis, strong persistent pains, acutely occurring pareses and/or considerable constraint of the spinal column. Admitted to neurology department	T) Intermittent mechanical traction, 1/3 of body weight, Tru-Trac motor, 5-second pauses, 20 min once a day for 5-7 days C) Sham traction with a force of up to 7kgs, 20 min once a day for 5-7 days	Improvement in back pain Improvement in leg pain Post-treatment	No difference between the two groups. Did not test for statistical significance.
Weber 1984 ⁽¹²⁾	94 patients Gender: 54 M, 40 F Symptoms: All had sciatica, radiating pain, neurological symptoms and signs of lesion of the L5 or S1 root and positive radiculogram. Excluded: spondylolisthesis or	Two trials: T1) Intermittent manual traction (Spina-Trac), force 40-70Kp for 10-12 secs followed by rest. 20 min once a day. C1) Simulated traction (in comparison to T1). T2) Continuous manual traction, therapist gently	Improvement (over-all assessment) Pain relief Outcomes after 1 week	No statistically significant differences in outcomes in either trial.

Traction for low-back pain

	previous spine surgery, root entrapment caused mainly by hypertrophic facet joints or a narrow bony canal in the last three studies. Recruited from hospital's Department of Neurology	leaning back against a belt placed below patient's knees, force <30 Kp. C2) Isometric exercises (in comparison to T2). Duration of treatment not stated.		
Werners 1999 ⁽³⁵⁾	147 patients Gender: 79 M, 68 F. Age: 20-60; Mean 38.7 yrs. Symptoms: LBP severe enough to warrant see orthopedic general practitioner; no previous surgery, significant medical condition or spinal disorder demonstrable on plain radiograph. Recruited from orthopedic primary care clinic	T) Motorized, intermittent lumbar traction, with simultaneous massage applied by two motorized, mechanical wheels moving up and down the spine while the patient is lying on their back, between 10-20 kgs, 6 sessions, 2-3 weeks C) Interferential therapy, standard Galva electrotherapy system, 6 sessions, 2-3 weeks	Function (ODI) Pain (VAS) Outcomes post-treatment and at 3 months	No statistically significant differences between groups.

RDQ: Roland Morris Disability Questionnaire; ODI: Oswestry Disability Questionnaire; VAS: Visual Analog Scale