Mulligan bent leg raise technique – a preliminary randomized trial of immediate effects after a single intervention.


**Design:** This double-blind, randomized, placebo-controlled trial compared the immediate effects (post treatment and at 24 hours) of the Mulligan bent leg raise (BLR) technique to a placebo.

**Methods:** Individuals that suffered from back pain and had a unilateral limitation of more than 15 degrees of straight leg raise (SLR) were recruited for the study. Participants who suffered from obvious neurological deficits as a result of their back pain were excluded from the study. Subjects were allocated to either a treatment (n=12) or control (n=12) group. SLR measurements were taken prior to the trial, immediately after the trial, and 24 hours later. SLR measurements were taken with the leg held straight in a splint and the ankle held in neutral with an ankle-foot orthosis. Rotation of the hip and pelvis were recorded to enable the degree of change in straight leg raise due to hip flexion to be accurately calculated. The treatment group consisted of the application of the Mulligan BLR technique, with three repetitions of pain-free five second isometric contractions of the hamstring muscles being undertaken on the side of the restricted straight leg raise. These were performed in five progressively greater positions of hip flexion. The placebo consisted of soft tissue manipulation of the foot, with the knee flexed to 20 degrees. Perceived pain was also recorded using a visual analogue scale (VAS) to monitor overall back pain symptoms immediately post-trial.

**Results:** Statistical analysis were applied to account for baseline differences between the two groups. Results show the BLR technique did not have a significant effect on the range of SLR immediately after the treatment. The difference between the groups adjusted means was 3 degrees. In contrast, the measurements recorded 24 hours post-intervention indicate that the technique had a significant effect on the range of SLR. The adjusted mean difference between the two groups at this point was 7 degrees. In both groups the VAS scores significantly reduced by 1/10 following the intervention, however the BLR was no more effective than the placebo both post intervention and at 24 hours.

**Conclusion:** This study provides preliminary evidence for the efficacy of the Mulligan BLR technique in improving SLR 24 hours after (but not immediately following) treatment. Pain also improved but not more so than following the placebo.

**Commentary:**

This article provides useful information and investigation into another technique that is practised in the clinical setting. At face value it indicates an improvement in straight leg raise of those subjects exposed to the Mulligan bent leg raise (BLR) technique, however it not only raises questions that relate to the actual mechanisms which may have influenced the observed results, but also draws attention to philosophical issues that influence both treatment and research decision making processes. In addition, some aspects of the trial that relate to the choice and implementation of the placebo may have influenced the results that were noted.

The authors suggest no likely rationale for the improvement in the SLR at 24 hours. The intervention, which consists of contract-relax cycles applied to the hamstrings in hip flexion, provides peripheral somatic input by way of the contracting muscles and the cutaneous contact of the therapist. Changes in alpha and gamma motor neuron activity (influencing the hamstring muscles) at a segmental level are likely following this technique, similar to those effects observed following the implementation of proprioceptive neuromuscular facilitation techniques when stretching muscles (Guissard, Duchateau et al. 1988; Osternig, Robertson et al. 1990; Guissard and Duchateau 2004) and this may affect the subjects perception of their SLR limit. Segmental inhibition of nociceptive responses may also occur. At a basic level, this is how Melzack and Wall’s (Wall and Melzack 1999) pain gate theory works – cutaneous input through large diameter peripheral fibres may override smaller pain fibre messages, thereby modifying the patients’ perception of their symptoms (ie pain relief). Regardless of the mechanism of action, the reason why this response should be observed at 24 hours and not immediately is unclear. It is also unclear from this trial how long this influence will last, and is an obvious area for further research.

The choice of placebo for this trial was interesting, as the authors ran the risk of influencing the outcomes in the placebo group. While soft tissue manipulation of the foot may seem far away enough from the back and posterior thigh to avoid direct influence, any peripheral cutaneous input has the ability to modify segmental processes at a spinal level. Given that the foot is innervated by lumbosacral nerves, it is possible that input to this area contributed in some way to the pain relief that the ‘placebo’ group reported.

There are issues and concerns in the methodology that may also be pertinent to the way the practising clinician plans and implements treatment procedures. It is worth noting that the straight leg raise (SLR) test is both a neurodynamic test and a test of hamstring extensibility (Gajdosik and Lusin 1983). This article fails to mention which of these conditions is involved in limiting the SLR of the subjects that present, which is interesting as the subjects had to have co-concurrent leg and back pain as a pre-requisite to entering the study. The fact that no neural sensitising measures (ie

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dorsiflexion during the SLR test) are employed indicates that either condition may be causing the perceived posterior thigh discomfort during the testing procedure. Given the very different nature of the two structures involved, the hamstring muscles or the sciatic nerve, this is likely to have an impact on the likely mechanisms of symptom modulation. Here-in lies this studies most obvious weakness. Specific treatment necessitates the clinician identifying, as thoroughly as possible, the actual cause of a symptom. In this trial, no attempt was made to differentially diagnose the cause of the restricted SLR. Clinicians have a responsibility to identify the structures and mechanisms responsible for the production of symptoms – this is undertaken in order to plan treatment accordingly. In this case, by failing to further identify a likely cause for the posterior thigh pain such as ‘hamstring pain’, ‘neurodynamic pain’, or even ‘gluteal bursitis’, intervention becomes a case of treatment by numbers, where a technique is matched to an area of symptoms and then implemented. As a clinical example, is it reasonable to use the same treatment technique on all clients that present with ‘posterior thigh pain’ without differentiating between likely causes? Scientific research should promote as full an examination of the facts as possible, and in this case the lack of further investigation into the cause of SLR restriction compromises this studies rigidity.

Many techniques are selected by therapists on the basis of their own empirical observations, and lack such scrutiny as required for general acceptance by the wider ‘scientific’ community. While that should not force clinicians into emptying their clinical closet of the armoury of techniques and approaches that may have been learned through a lifetime of clinical work and empirical observation, it is necessary that a decision making framework is in place when planning change to a patient’s treatment or intervention. By applying such a methodology to intervention processes, which will naturally encompass such things as commonly used techniques, we can hopefully provide reasonable and rational arguments for the efficacy of our treatment. In this way, we can modify treatment techniques to suit the presentation of the client in most scenarios. For the practicing therapist, it becomes necessary to ask the question: what structure(s) or systems am I trying to influence? How will that help this patient? And is this argument a reasonable defense for the intervention I am about to provide?

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Exercise therapy is effective for chronic low back pain, but should be individually prescribed and supervised.


(Approducts prepared by J. Haxby Abbott)

**Design:** A systematic review of studies evaluating the effectiveness of exercise therapy in adults with non-specific low back pain (LBP) identified 61 randomised, controlled trials meeting the inclusion criteria. Studies were divided into acute, subacute, and chronic LBP categories. The authors performed both quality rating of the studies, and pooling of the data in a meta-analysis.

**Main Outcome Measures:** Pain and functioning were the most consistent outcome measures across included trials. Return to work, absenteeism, and global improvement were also reported in some studies.

**Results:** Most (43) included studies were of chronic LBP. In this group, exercise therapy was more effective than other conservative treatments for reducing pain (6 points more improvement, on a 0-100 pain rating scale), and even more effective than no treatment (10 points more improvement with exercise therapy). Exercise therapy was superior to comparison groups over the short-, intermediate- and long-terms. Functional outcomes also favoured exercise therapy over comparisons (by 2.5 points). Subacute and acute populations did not fare as well. Only 6 studies involved patients in the subacute stage, finding exercise therapy equivalent to comparison groups for both pain and functioning, over the short- and intermediate-term. There was, however, moderate evidence of reduced absenteeism. Studies involving patients with acute LBP (11) were conflicting, but generally showed no benefit of exercise therapy over non-exercise comparison groups, for either pain or functioning. Trends at long-term follow-up were similar.

**Conclusions:** In acute LBP, exercise offers no benefit over other interventions or no intervention. In subacute LBP, graded-activity exercises are effective in reducing absenteeism in occupational settings. In chronic LBP, evidence strongly suggests that exercise therapy significantly improves pain and functional outcomes.


**Design:** A systematic review examining the exercise intervention characteristics of studies evaluating the effectiveness of exercise therapy in adults with chronic LBP.

**Studies included:** Forty-three randomised, controlled trials involving patients with LBP of >12 weeks duration.

**Main outcome measures:** Pain and function.

**Exercise intervention characteristics:** The authors looked at the type of exercises, mode of delivery, dose or intensity, and additional interventions.

**Statistical methods:** Meta-analysis and meta-regression, to assess the the independent influence of each level of characteristics. These methods allow ranking of exercise characteristics from best to worst.

**Results:** Individually-designed exercise interventions were more effective than standardised sets of exercises (8.4 points versus –4.3 for pain, 1.7 vs –2.0 for function). Partially individually-designed programmes were ineffective (0.6 points for pain, 1.3 for function). Supervised home exercises were more effective for pain (6.5 points) but not function (-2.2 points), with one-on-one supervision most effective for improving function (2.2 points), but with equivocal effect on pain (1.6 points). Group supervision was largely ineffective. Home exercises only (without supervision) were poorest (-7.5 for pain, -2.0 for function). High dose (≥20 hours total course) exercise was superior to lower dose for both pain and function (by 2.6 points and 1.4 points respectively). Additional interventions also improved outcomes (by 5.3 points and 2.1 points for pain and function respectively). Stretching exercises ranked best for improving pain, strengthening for improving function. “Other specific” exercises also fared well for improving both pain and function, slightly better than aerobic exercise. Coordination exercises were worst, and appear ineffective.

**Conclusions:** The type, dose or intensity, and mode of delivery of exercises, as well as the provision of additional interventions, have a significant effect on outcomes in patients with chronic low back pain.
Commentary:

The first of these two studies is simply a timely update, but the second is novel and important. What type of exercise interventions work, how should they be delivered, and by whom? Physiotherapists are by far the profession most involved in prescribing exercise in the health-care environment, and this study provides important information guiding best practice. The data clearly indicate that what type of exercise we prescribe can have a marked impact on outcome. Of the six exercise types, exercises intended to increase muscle strength clearly had the most beneficial effect on function, while exercises intended to increase the range of motion of a specific joint or muscle group had the most beneficial effect on pain. “Other specific” exercises, such as McKenzie, Mensendieck, and other “brand-name” methods, came a close second for improving both pain and function, with aerobic fourth ‘mobilising’ exercises (poorly described as “repeated exercises, using controlled movements throughout a joint’s normal range”) fifth, and coordination exercises a distant sixth. Individually prescribed exercise programmes got better results for pain control, compared to non-individualised standard programmes, although on average didn’t affect function significantly. The data indicate that standardized sets of exercises (like booklets) actually worsen pain and functioning (~4.3 and –2.0 respectively), as do unsupervised home exercises (~7.5 and –2.0 respectively). Delivering exercises by individual supervision appeared best for improving function, but the data available did not find the amount of difference significantly superior to other delivery modes. Supervised home exercises (in which the patient met with a therapist initially, was instructed in the exercises, and then was followed up by the therapist at least every 6 weeks) was about as effective as individual supervision, on average, but individual supervision had a tighter confidence interval. Exercises should be prescribed in a dose of at least 20 hours per course. Importantly, the provision of other interventions (such as NSAIDs or manual therapy) in addition to exercise therapy was associated with superior results compared to exercise alone.

Naturally, these results are averages, and the design of RCTs mask the individual-level differences between patients that influence treatment plan decisions. Clinical judgement by the prescribing therapist is essential, and the present study supports this by finding that individually prescribed programmes, based on the findings of a thorough clinical examination, are most effective, and standardized programmes (like a booklet) actually harmful.

This is information that should not only guide our practice, but should also influence the design of our patient facilities. Best results are likely to be achieved by therapists giving hands-on instruction, prescribing specifically tailored exercises based on clinical indications, that include strengthening and stretching components, for home use as well as one-on-one supervision, grading progression, ensuring an adequate dose is achieved, and following up regularly.

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