

Bystrom MG, Rasmussen-Barr E, Grooten WJA. Motor Control Exercises Reduces Pain and Disability in Chronic and Recurrent Low Back Pain. Spine 2013;38:E350-E358.

Design: Meta-analysis of randomized clinical trials

PICOS

- Patient population: Patients 16 and older classified as having chronic or recurrent LBP
 - o “Chronic” was defined as lasting more than 12 weeks
 - o “Recurrent” was defined as pain returning after a pain-free interval
- Intervention: Motor control exercises (MCE)
 - o Studies needed to designate the intervention as MCE, segmental stabilizing exercise, or specific stabilizing exercise
 - o MCE was also classified if the intervention included exercises defined as “abdominal draw-in” or “abdominal hollowing”
 - o MCE was similarly considered to be the intervention if the exercise was stated to isolate isometric contraction of the transversus abdominis or the multifidus; some studies included MCE for the diaphragm and pelvic floor
- Comparison: studies needed to have a clear contrast with a different intervention, sorted into five categories
 - o MCE vs. general exercise (trunk strengthening, trunk stretching, cardiovascular fitness, home exercises)
 - o MCE vs. spinal manual therapy
 - o MCE vs. minimal intervention
 - o MCE vs. multimodal physical therapy
 - o MCE as part of a multimodal intervention vs. the other components of that intervention
- Outcomes: Pain and/or disability
 - o Follow-up had to be at least 6 weeks
 - o Data had to be presented in a way that permitted calculation of mean change from baseline and the standard deviation of the change
 - o Outcome from different scales (e.g., Oswestry vs. Roland Morris) were converted into a 100 point scale for computation of weighted mean differences (WMD), which was the effect measure for all comparisons in the pooled meta-analysis
 - o “Short term” was defined as 6 weeks to 4 months; “intermediate term” was 4 months to 8 months; “long term” was 8-15 months
- Study types: Randomized clinical trials

Study search and selection:

- Databases were searched through October 2011 and included PubMed, EMBASE, PEDro, and CINAHL

- Two reviewers examined the titles from the search and selected abstracts for further investigation; the second reviewer was blinded to the authors of the studies when making the selection
- Quality was rated on the PEDro 10 point scale; high quality was considered to be when a study had 6 or more points on the scale
- Quality scores were not used to exclude studies

Results:

- 16 studies were included in the analysis; 10 were high quality and 6 were low quality
- For MCE vs. general exercise, there were 7 included studies, 5 of high quality and 2 of low quality
 - o The pooled results favored MCE over general exercise in the short, intermediate, and long terms
 - o On the 100 point scale for pain, the short and intermediate WMD were 7.80 and 6.06
 - o On the 100 point scale for disability the short, intermediate, and long term WMD were 4.65, 4.86, and 4.72
 - o For pain and disability, the 95% confidence intervals all excluded the null value of zero, but none of the confidence intervals had a value greater than 11 out of 100
- For MCE vs. spinal manual therapy, there were 3 studies, 1 of high quality and 2 of low quality
 - o For pain, there was no difference between MCE and manual therapy
 - o For disability, MCE was superior to manual therapy in the short, intermediate, and long terms, with pooled WMD of 6.12, 5.27, and 5.76
 - o The 95% confidence intervals for disability excluded zero, but none exceeded 12
- For MCE vs. minimal intervention (education, placebo ultrasound, no intervention) there were 3 studies, 1 of high quality and 2 of low quality
 - o The pooled WMD for pain showed MCE better than minimal intervention in the short (12.48), intermediate (10.18), and long terms (13.32)
 - o The high end of the 95% confidence intervals were greater than for previous comparisons; for the short term it was 19.04 and for the long term it was 19.75
 - o For disability, MCE was also superior in short term (9.00), intermediate (5.62) and long terms (6.64); for the short term, the high end of the 95% confidence interval was 15.28
- For MCE vs. multimodal physical therapy, there were 4 studies, 3 of high quality and 1 of low quality, but not enough data to estimate the effects in the long and short terms, only in the intermediate term
 - o For intermediate term pain, MCE was superior to multimodal PT, with pooled WMD of 14.20 (95% CI from 7.16 to 21.23)

- For disability, MCE was superior, with WMD of 12.98 with 95% CI from 6.47 to 19.49
- For MCE as part of a multimodal intervention vs other components of that program, it was not possible to pool data, because the included studies reported outcomes at different time points

Authors' conclusions:

- MCE is superior to general exercise for chronic and recurrent LBP with regard to pain and disability
- MCE is superior to manual therapy with regard to disability but not pain
- MCE is superior to minimal intervention with regard to disability and pain
- Many studies did not report change scores, only baseline and follow-up scores; this required the authors to compute change scores using methods which impute the correlation between baseline and change scores, but the assumptions in the analysis are likely to underestimate, not overestimate the treatment effect
- Although some authors have attributed the effects of MCE to the effects of general exercise, the results of this analysis suggest that there is benefit to targeting the transversus abdominus and multifidus muscles for special attention in formulating exercise rehabilitation for back pain

Comments:

- Although there are forest plots of the pooled analysis in Figures 1 through 5, there are no numbers to indicate the means, standard deviations, and sample sizes
- The authors stated that they would use random effects models when there was statistical heterogeneity and fixed effect models when the results were statistically homogeneous, but none of the tables or forest plots indicate which model was used
- Similarly, the most useful measure of statistical heterogeneity, the I^2 , was not reported for any of the analyses
- The authors do acknowledge that statistical significance is not necessarily clinical importance
 - The effect sizes were reported as weighted mean differences when all outcomes were converted to a 100 point scale
 - Many of the pooled WMD were fairly small and most did not have confidence intervals exceeding 12 points
- Although the degree of superiority of MCE is uncertain, the data do support a conclusion that MCE is at least as effective as general exercise and manual therapy in improving pain and disability

Assessment: Adequate for good evidence that a program of motor control exercises, emphasizing the transversus abdominis, multifidi, and possibly the diaphragm and pelvic floor muscles, is at least as effective as general exercise and manual therapy, and is likely to be more effective