Journal of Bodywork and Movement Therapies (2008) **12**, 312–317

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Journal of
Bodywork and Movement Therapies

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CLINICAL METHODS STUDY

A comparison of two muscle energy techniques for increasing flexibility of the hamstring muscle group

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Received 17 April 2008; received in revised form 15 June 2008; accepted 17 June 2008

KEYWORDS
Muscle;
Hamstring;
Stretching;
Isometric;
Osteopathic medicine

Summary Variations in the application of muscle energy technique (MET) for increasing the extensibility of muscles have been advocated, but little evidence exists to support the relative merit of a particular approach. This study investigated two types of muscle energy techniques that have been advocated in the osteopathic literature that differ primarily in the duration of the post-contraction stretch phase. Forty asymptomatic participants (mean age = 22.1 ± 3.5, male female = 1:4) were randomly allocated to one of two groups (Group 1: MET with 30-s post-isometric stretch phase; Group 2: MET with 3-s post-isometric stretch phase). Hamstring length was measured using active knee extension (AKE). Participants received an initial application of the allocated intervention, and then a second application 1 week later. Analysis with a split-plot ANOVA revealed a significant effect of time ($F_{3,36} = 42.30$; $p < 0.01$), but no significant time*group interaction ($F_{3,36} = 0.12$; $p = 0.95$). Post-hoc analysis revealed that the significant differences over time occurred between pre- and post-measurements at both weeks, and between post-Week 1 and pre-Week 2 measurements.

Both techniques appeared to be equally effective in increasing hamstring extensibility, and there appeared to be sustained improvement 1 week following the initial treatment. The findings suggest that altering the duration of the passive stretch component does not have a significant impact on the efficacy of MET for short-term increases in muscle extensibility.

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doi:10.1016/j.jbmt.2008.06.011

Introduction

Muscle energy technique (MET) is a manual procedure that uses controlled, voluntary isometric contractions of a targeted muscle group and is widely advocated by authors in the field of osteopathy. MET is claimed to be useful for lengthening a shortened muscle, improving range of motion at a joint and increasing drainage of fluid from peripheral regions (Greenman, 2003). Muscle energy procedures, and related post-isometric procedures such as proprioceptive neuromuscular facilitation (PNF), have been demonstrated to be more effective than static stretching for improving the extensibility of shortened muscles (Handel et al., 1997; Magnusson et al., 1996a; Sady et al., 1982).

Passive stretching of various muscle groups, particularly the hamstrings, has been reported to improve the length and extensibility of muscles in both short and long-term periods of stretching (Bandy et al., 1997; Bandy et al., 1994; Feland et al., 2001; Roberts and Wilson, 1999). Additionally, many researchers have reported that post-isometric stretching techniques, such as MET and PNF, produce greater changes in range of motion and muscle extensibility than static or ballistic stretching, immediately following treatment (Cornelius et al., 1992; Moore and Hutton, 1980; Tanigawa, 1992; Wallin et al., 1985) and in the longer term (Handel et al., 1997; Magnusson et al., 1996a; Sady et al., 1982; Wallin et al., 1985). The exact mechanism by which increased muscle extensibility occurs is still unclear, and probably involves both neurophysiological (including changes to stretch tolerance) and mechanical factors (such as viscoelastic and plastic changes in the connective tissue elements of the muscle) (Fryer, 2006).

Although there are many variations of the application of MET, with most authors in the field of osteopathy advocating a post-isometric stretch for increasing muscle length, the recommended duration for the passive stretch component varies. A typical application of MET for the purpose of lengthening a shortened muscles involves the following steps: (1) stretch the muscle to a palpated 'barrier' or to the patient's tolerance of stretch, (2) the patient produces a voluntary isometric contraction of the muscle under stretch against the clinicians' controlled and equal counterforce, (3) the muscle is allowed to relax, while the clinician maintains a stretch for a defined period, (4) the clinician 'takes up the slack' following relaxation so that the muscle has been lengthened to a new barrier, (5) this process is repeated several times. It is possible to alter the application of MET by with variations to the components of the technique: the force and duration of the isometric contraction phase, the duration of the post-contraction stretch phase, and the number of repetitions. The literature currently offers little guidance as to the most efficacious application (Fryer, 2006).

In the osteopathic literature, two markedly different applications of MET for increasing muscle extensibility have been advocated by Greenman (2003) and Chaitow (2006), with differences in the number of repetitions (3–5 and 3, respectively), and the period of passive stretching between the isometric contractions. Chaitow suggests a stretch duration following isometric contraction to be held for at least 30 and up to 60 s for chronically shortened muscles, whereas Greenman (2003) and Mitchell et al. (1979) recommend only enough time (several seconds) for patient relaxation and tension to be taken up in the affected tissue. The relative merit and efficacy of these different approaches have not been investigated.

Ballantyne et al. (2003) and Lenehan et al. (2003) used techniques similar to the Greenman protocol, both following a 5–7 isometric contraction with a passive stretch lasting only several seconds until the new barrier was engaged. Other researchers have used PNF techniques similar to the Chaitow method, such as Wallin et al. (1985) and Handel et al. (1997), who used a maximal isometric contraction with a 15 s rest period. While these techniques were similar to the method advocated by Chaitow, the duration of the stretch (15 s) was shorter than the recommended minimum of 30 s (Chaitow, 2006). The longer passive stretch of the Chaitow approach may make the technique more effective, given that passive stretching for a 30-s (Bandy and Irion 1994) or 60-s (Feland et al., 2001) period have been reported to be more efficacious for increasing muscle extensibility than shorter durations.

The relative efficacy of the Greenman and Chaitow approaches for increasing myofascial extensibility should be investigated. Most research involving MET has focused on a single application of treatment (Ballantyne et al., 2003; Mehta and Hatton, 2002; Magnusson et al., 1996a), but practitioners typically deliver more than one treatment for a patient complaint, and anticipate that there will be carry-over changes still present from the previously delivered treatment. This study aimed to determine the relative efficacy of the two approaches for increasing the extensibility of the hamstring muscles, and determine if there were any carry-over changes in hamstring length, or changes in responsiveness to treatment, when the