CRITICALLY APPRAISED TOPIC

Changes in Hamstring Range of Motion Following Proprioceptive Neuromuscular Facilitation Stretching Compared With Static Stretching: A Critically Appraised Topic

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Clinical Scenario

Stretching is commonly used in the medical, health, and fitness fields, as well as in school and military settings to increase flexibility and range of motion (ROM) at various joints.1–3 Static stretching has been used for many years and requires the individual to lengthen the muscle to end range and hold this position for varying amounts of time.4–6 Numerous studies have been performed to understand appropriate stretch duration; however, treatment application varies between 5–60 s.4–9 Proprioceptive neuromuscular facilitation (PNF) stretching is another type of stretching used frequently to increase ROM.5,10 A combination of contraction and relaxation of either agonist or antagonist muscles is used during PNF stretching.5,6,10,11 Although both static and PNF stretching techniques have been touted as effective, there remains a need to identify whether one method is more effective than the other when focusing on the hamstrings musculature.

Several researchers have performed comparison studies to determine the most effective stretching technique and protocol for increasing ROM measures. A previous systematic review of PNF was performed to complete general comparisons for PNF and static stretch techniques for range of motion gains. The previous systematic review was published in 2006, and included studies that were not exclusive to hamstring ROM.12 Therefore, there was a need to critically appraise the literature regarding the effects of PNF and static stretching on hamstring ROM. Critically appraising the efficacy of static versus PNF stretching in individuals with tight hamstrings may offer important insight into use of these techniques in clinical practice when treating individuals presenting with tight hamstrings.

Focused Clinical Question

In individuals with hamstring tightness, what is the effect of using PNF stretching compared with static stretching on traditional measures of hamstring ROM?
**Search Strategy**

A computerized search was completed in April 2015 (Figure 1).

**Terms Used to Guide Search Strategy**

- **Patient/client group**: Healthy adults with or without hamstring tightness
- **Intervention/assessment**: PNF OR proprioceptive neuromuscular facilitation
- **Comparison**: static stretching
- **Outcome**: flexibility OR range of motion

**Sources of Evidence Searched**

- CINAHL Plus
- Health Source
- SPORTDiscus
- PubMed Central
- Additional references obtained via reference list review and hand search

**Inclusion Criteria**

- Limited to studies that compared PNF stretching to static stretching
- Limited to studies that included individuals classified with tight hamstrings but absent of any additional pathology. Tight hamstrings are defined as 20° from vertical on the knee extension angle (KEA)\(^5\) or active knee extension (AKE)\(^6\)\(^,\)\(^10\) measurement with the hip at 90° of flexion.
- Limited to articles written in the English language
- Limited to articles written in the last 10 years (2005–2015)
- Limited to Level 4 evidence or higher

**Exclusion Criteria**

- Studies that used minors as participants
- Studies that used an injured population as participants
- Studies that did not compare PNF stretching to static stretching
- Studies that did not include pre- and posttreatment mean ROM outcomes

**Evidence Quality Assessment**

Validity of the selected studies was assessed using the Physiotherapy Evidence Database (PEDro) scale (see Table 2). The three included articles were identified on the PEDro website with accepted and approved scores; these scores were used in this critically appraised topic (CAT).\(^13\)

**Results of Search**

Three relevant studies were located using the search terms identified in the Search Strategy section. As described in Table 1, the studies selected for inclusion