Effect of Sub-Occipital Instrument-Assisted Soft Tissue Mobilization on Visuomotor Reaction Time

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BACKGROUND AND PURPOSE

• Reaction time (RT) is an important aspect of sport performance and may be critical for injury avoidance.
  - A baseball batter has approximately 200 ms to react to a fastball as it leaves a pitcher's hand.1
  - An average of only 40 ms differentiated athletes who sustained non-contact ACL injury from matched controls.2

• Simple visuomotor RT represents the amount of time that elapses between a single stimulus and a motor response.

• Choice visuomotor RT requires more time for cognitive processing of complex visual input for a correct response.3

• Cerebral blood flow,4 as well as somatosensory input from joints and muscles, may accelerate Choice RT.

• Sub-occipital muscle tension decreases blood flow within the vertebral arteries.5

• The purposes of this study were to assess any changes in visuomotor RT attributable to instrument-assisted soft tissue mobilization of the sub-occipital muscles or an effect attributable to gender among athletes.

PARTICIPANT CHARACTERISTICS AND PROCEDURES

• Participants were 55 college students (23 males, 32 females) randomly assigned to experimental or control group.
  - Control group: n=27 (16 females; 11 males)
  - Experimental group: n=28 (16 females; 12 males)

• Dynamic D2 system (Dynavision International, West Chester, OH) used to assess visuomotor RT (Figure 1).

• All participants completed a 30-s familiarization trial for each of 4 RT test modes:
  - Mode A (Proactive Simple RT): Targets remain illuminated (red) until hit; tachistoscope (T-scope) inactive
  - Mode B (Reactive Simple RT): Targets illuminated for 1 s only (red); T-scope inactive
  - Mode C (Reactive Choice RT): Targets illuminated (green or red) for 1 s; goal to hit green only; T-scope active

• Mode D (Peripheral Reactive Simple RT): Targets in outer 3 rings illuminated (red) for 1 s; T-scope active

• Test trials (30 s each for all 4 modes) completed within 40 min:
  - Trial 1 (baseline), Trial 2 (10-min interval), Trial 3 (15-min interval), Trial 4 (15-min interval)

• Experimental group: 10-min MT procedure between Trial 1 and Trial 2

• Procedure utilized 7-lb MT instrument (AcuForce+ 7.0, Magister Corp., Chattanooga, TN)

• Concentrated mechanical stimuli applied to trigger points from occiput to superior margin of scapulae (Figure 2D)

• Direct pressure over trigger points; 12-s hold; distal progression in ½-in increments

• Procedure repeated along linear path that was ½-in lateral to initial progression

• Control group participants rested for 10-min interval between Trial 1 and Trial 2

• Repeated measures ANOVA used to evaluate significance of interaction (group x trial) and main effects (p<.05)

• No-interaction effect or significant difference found between experimental and control groups for any trial or mode:
  - MT did not have a significant effect on visuomotor RT

• Significant differences between trials evident for all 4 test modes, indicated performance improvements.

• Analysis of athletes demonstrated gender differences for 3 of the 4 test modes (Figures 3-6):

  - Mode A: no gender x trial interaction (p=.463); no significant gender difference across trials (p=.773)
  - Mode B: significant gender x trial interaction (p=.046); males faster than females for all trials (p=.017)
  - Mode C: significant gender x trial interaction (p=.299); significant gender difference; males faster than females (p=.005)
  - Mode D: significant gender x trial interaction (p=.049); males faster than females for all trials (p=.017)

• Females generally demonstrated greater trial-to-trial improvements in RT for all modes compared to males.

REFERENCES