

Examining the Effect of Partial-Range of Motion Bench Press Exercise on Metabolic Work, Regional Myoelectrical Amplitude, and Local Muscle Hyperemia: A Pilot Study

JACOB D. FANNO, IAN W. POWELL, COLE M. HAMBRIC, and DANIEL E. NEWMIRE

Exercise Physiology and Biochemistry Lab; Kinesiology; Texas A&M University-Corpus Christi; Corpus Christi, TX 78412

Category: Undergraduate

Advisor / Mentor: Newmire, Daniel E. (daniel.newmire@tamucc.edu)

ABSTRACT

Traditionally, it is recommended to utilize a full-range of motion (fROM) during resistance training; however, recent data has found that using a partial-range of motion (pROM) may elicit similar hypertrophy and strength gains. Further research is required to assess the acute physiological differences of pROM in comparison to traditional fROM during a resistance exercise bout. **PURPOSE:** The purpose of this pilot study is to observe the metabolic work, myoelectrical amplitude, and muscle hyperemia during and following bouts of both flat and incline barbell bench press exercises with differing ranges of motion. **METHODS:** One male subject (21.6y; 168cm; 83kg; 20.4%BFat) was randomized to two-bouts flat (FB) and two-bouts of 45°-incline (IB) bench press exercise using either pROM or fROM using a bi-acromial grip width of 200%. For the pROM bouts, an elitefts™ pad was installed on a Smith machine (SM) to control descent distance and the subject was instructed to not fully extend the elbow at the apex of barbell ascension. Seven-days prior to each FB/IB bout, 1RM strength test took place and an MVIC test was administered prior to the FB/IB-bout. The bout intensity was selected to be 75% of 1RM. The subject performed 3 sets and as many repetitions until concentric failure. The SM was equipped with linear position transducer that assessed repetition count, bar height, and displacement (dip). Surface electromyography (sEMG) sensors were placed on the anterior deltoid (AD), pectoralis major-clavicular (PMC), pectoralis major-sternal (PMS), triceps medial (TM), triceps lateral (TL), and an electric joint goniometer was used to assess elbow flexion angle change. Blood lactate (La) samples were captured pre- and post-bout. Ultrasound measures of muscle thickness (MT) and cross-sectional area (CSA) values were collected Pre-, Immediate-post (IP), and 24 h post-bout at 10, 25, 50, and 60% distal to the sternal-clavicular notch. **RESULTS:** The pROM-FB bout had the highest volume load:12,688 sets-reps·kg, reps: 38, and lowest average ROM distance (20.43 cm); Δ La was highest after fROM-IB (7.8 mmol/L) concurrent with the highest average ROM distance (32.96 cm); pROM-IB Δ La showed the lowest (3.9 mmol/L); MVIC testing using 1RM (MVIC-1RM) for pROM-IB and fROM-IB had values \leq 150% compared to standard MVIC (Std-MVIC) \geq 150%; no differences were found between MT, CSA, and estimated muscle volume Δ % comparing Pre, IP, and 24 h at 10, 25, 50, 60% between bouts. **CONCLUSION:** Our current data show that greater volume load does not equate to higher post-bout La concentrations, ROM may influence primary agonist peak sEMG amplitude, yet does not influence greater local post-bout hyperemia, and MVIC-1RM may be a useful tool to capture MVIC.