

29th ECSS Anniversary Congress, Glasgow/UK, 2–5 July 2024

Distinct hypertrophy of the elbow flexors after incline versus preacher dumbbell curl training

Kobayashi, Y., Maeo, S.1, Eihara, Y.1, Ono, M.1, Sato, M.1, Sugiyama, T.1, Kanehisa, H.2, Isaka, T.1

1. Ritsumeikan University 2. National Institute of Fitness & Sports in Kanoya, Japan

INTRODUCTION:

The elbow flexors consist of the biceps brachii (BB), brachialis (BRC), and brachioradialis (BRR). Among them, BB is a biarticular muscle crossing not only the elbow but also the shoulder joint, and lengthened more in a shoulder-extended than shoulder-flexed position. Previous studies have found greater muscle hypertrophy after training at long than short muscle lengths (e.g. seated > prone leg curl for the hamstrings [Maeo et al., 2021] and standing > seated calf raise for the triceps surae [Kinoshita et al., 2023]). Based on these findings, this study examined the effects of incline (shoulder-extended, BB lengthened) versus preacher (shoulder-flexed, BB shortened) arm curl training on elbow flexor hypertrophy.

METHODS:

Twenty-one untrained healthy young adults participated in this study. Using a dumbbell, they performed incline arm curls with one arm and preacher arm curls with the other arm (shoulder 50-deg extended and flexed, respectively) at 70% of one repetition maximum of the corresponding task. Each arm performed 5 sets of 10 repetitions per session (2 s for each of the concentric/eccentric phases), 2 sessions per week for 12 weeks. Before and after the intervention, T1-weighted axial 3-T MR images (field of view: 200 × 200 mm, slice thickness & gap: 2.5 mm) were obtained to assess muscle volume of BB, BRC, BRR, and the whole elbow flexors. In addition to muscle volume, anatomical cross-sectional area (ACSA) was calculated/interpolated at 10% intervals of muscle length (i.e. 10–90%, proximal–distal) for each muscle to examine whether regional hypertrophy occurred after each training.

RESULTS:

Muscle volume significantly increased in all three muscles and the whole elbow flexors for both arms. The changes in whole elbow flexor volume did not significantly differ between the incline and preacher conditions (+16.5% vs +17.6%, $P = 0.167$, Cohen's $d = 0.18$). However, the changes in BB muscle volume were significantly greater for the incline than preacher condition (+18.0% vs +14.9%, $P = 0.026$, Cohen's $d = 0.41$), with significant between-condition differences in ACSA changes found in proximal muscle regions (at 20–40%, $P = 0.015–0.045$, $d = 0.48–0.80$). On the other hand, BRC (+17.0% vs +21.0% $P = 0.022$, $d = 0.52$) and BRR (+10.0% vs +13.0%, $P = 0.018$, $d = 0.49$) had significantly greater muscle volume changes after the preacher condition. Significant between-condition differences in ACSA changes were found in distal muscle regions (at 70–80%, $P = 0.005–0.014$, $d = 0.76–0.81$) for BRC and in a middle muscle region (at 60% $P = 0.001$, $d = 0.72$) for BRR.

CONCLUSION:

While incline and preacher arm curls resulted in similar whole elbow flexor hypertrophy, the former appears more effective for BB and the latter for BRC/BRR hypertrophy, especially their proximal and distal/middle regions, respectively.

REFERENCES:

Maeo et al. (2021) *Med Sci Sports Exerc*, 53(4), 825-37.
Kinoshita et al. (2023) *Front Physiol*, 14, 1272106.

Topic: Biomechanics

Presentation: Poster

European Database of Sport Science (EDSS)

Supported by SporTools GmbH



35146