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The Rate Of Power Improvement Of The Upper Limb During Novel Training Loads In Females

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Initial training-induced improvements in skeletal muscle performance are largely mediated by neural adaptations. Although widely investigated, technological advancements now permit more precise capturing of the kinematic changes following novel training stress.
PURPOSE: To measure changes in upper limb power among females initiating training on an unfamiliar device.
METHODS: We tracked 28 women during consecutive exercise sessions using Proteus (Proteus Motion, USA), which produces 3D isotonic, concentric-only resistance. All subjects completed 5 exercise sessions on separate days. Each session included bilateral biceps curls (BC), bilateral triceps extensions (TE), and unilateral BC and TE with the dominant and nondominant arms. We captured peak power (w) in each set performed. Paired-samples t-tests compared power outputs between sessions 1 and 5. Linear regression models measured the effect of training session number on peak power holding age constant.
RESULTS: Subject age was 34.6 ± 14.5 yr, height was 65.0 ± 2.9 in, and weight was 160.5 ± 29.4 lb. During the initial session, subjects achieved peak powers of 163.0 ± 107.3 w in bilateral BC, 151.3 ± 64.4 w in dominant arm BC, 144.2 ± 67.0 w in nondominant arm BC, 163.1 ± 108.5 w in bilateral TE, 151.6 ± 75.8 w in dominant arm TE, and 133.1 ± 79.9 w in nondominant arm TE. At session 5, subjects increased bilateral BC by 22.4 ± 30.1 w ($p=0.001$), dominant arm BC by 10.4 ± 29.3 w ($p=0.103$), nondominant arm BC by 8.4 ± 31.5 w ($p=0.186$), bilateral TE by 34.1 ± 30.3 w ($p<0.001$), dominant arm TE by 15.0 ± 44.0 ($p=0.131$), and nondominant arm TE by 14.2 ± 46.2 w ($p=0.155$). Linear regression found each additional bout of training to increase unilateral BC power by 3.2 w ($p=0.018$; 95% CI of β: 0.6, 5.8) while holding age constant ($p<0.001$; 95% CI of β: -1.6, -1.1); dominance was insignificant ($p=0.811$) and not controlled. Each additional exercise session predicted an increase in unilateral TE power by 4.9 w ($p=0.014$; 95% CI of β: 1.0, 8.8) while holding age constant ($p<0.001$; 95% CI of β: -1.9, -1.2); dominance was insignificant ($p=0.521$) and not controlled.
CONCLUSIONS: Among females initiating a novel, concentric-only exercise program, improvements in upper limb power occurred within the first 5 sessions. Bilateral motions may experience a more robust early response than unilateral motions.

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The Impacts Of Wrist Wrap Type And Sex On Bench Press Muscular Strength And Power

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While wrist wraps have become increasingly prevalent in both competitive and recreational demographics, their posited ability to augment bench press performance by enhanced wrist stability still remains unclear.
PURPOSE: To determine the effect of varying wrap styles on bench-specific muscular strength and associated power, as well as quantitative and subjective differences between sexes.
METHODS: Eighteen resistance trained males and females (9M/9F; 24±4y) visited the laboratory on three separate occasions in randomized, crossover, and counterbalanced design to sport either a flexible wrist wrap (FW), stiff wrap (SW), or a no wrap control (NW) condition. All participants underwent a bench press one-repetition maximum (1RM) test and linear position transducer-derived peak power and velocity assessments. Furthermore, subjective stability (SS) and discomfort (SD) were determined promptly following 1RM attempts. Bench press performance and sex-collapsed subjective variables were analyzed using a two-way (condition x sex) mixed model ANOVA with repeated measures and a nonparametric Friedman's ANOVA, respectively. Both analyses were performed at a $p<.05$ significance level.
RESULTS: Analyses failed to detect any main condition or interaction effects for bench press 1RM, however, a statistically significant main sex effect was observed ($p<.001$; $\eta_p^2=.597$) favoring males relative to females ($p<.001$; 114±22kg vs 68±16kg). Both peak power and velocity failed to reveal any significant main condition or sex effects, nor any interactions. Nonparametric assessments further revealed significant wrist wrap condition effects for both SS ($p<.001$; Kendall's W=.628) and SD ($p<.001$; Kendall's W=.935), whereby NW was statistically more comfortable ($p<.001$) than either wrap condition, without any difference between DW and SW ($p>.05$).
CONCLUSIONS: Although wrist wraps did not significantly alter bench press-specific strength and power, participants nonetheless perceived wrist wraps as subjectively more stable irrespective of increased discomfort.

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Electromyographic Activity Of The Heads Of The Triceps Brachii During Selected Exercises

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The triceps brachii is an important functional muscle for daily activities that includes three heads: the medial head (MedH), the lateral head (LatH) and the long head (LongH). Nonetheless, there are few controlled studies that have examined the ability of specific resistance training exercises to target these heads.
PURPOSE: This study compared the mean electrical activities (rmsEMG) of the three head of the triceps brachii during the triceps pushdown, low cable pullover and high cable pullover. Twelve men (n=12, 20.6±1.3y) and 12 women (n=12, 21.0±2.1y) with a 2.2±1.7 years of lifting experience had bipolar EMG electrodes affixed to the three heads of their triceps brachii. They then performed three repetitions of three exercises at 70%1RM.
RESULTS: The triceps pushdown exercise showed significant main effects for repetition ($F(1.55,102.19) = 79.65$, $p < 0.001$) and muscle ($F(2,66) = 3.34$, $p = 0.042$). Pairwise analyses among muscles showed that the MedH produced significantly greater rmsEMG than the LatH (MD ± SE= 111.8 ± 53.6 μV; $p = .041$; $d = 0.62$) and LongH (MD ± SE= 126.5 ± 53.6 μV; $p = .021$; $d = 0.70$). Results for the low cable pullover also showed significant main effects for repetition ($F(1.37,90.68) = 10.04$, $p < 0.001$) and muscle ($F(2,66) = 6.12$, $p = 0.004$). For muscles, the MedH produced significantly greater electrical activity than the LongH (MD