INTRODUCTION

Changes in body composition variables as well as strength and power performance are both apparent after resistance training interventions. PURPOSE: To compare multiple body composition variables and how these relate to changes in strength and power. METHODS: Eight trained men (25.8 ± 4.3 years; height: 176.7 ± 5.0 cm; weight: 80.3 ± 2.6 kg) completed a 10 week resistance training program. The first 8 weeks consisted of daily undulating periodized resistance training 3 days per week, focusing on either muscular hypertrophy, power, or strength. The final 2 weeks featured an overload and taper phase. Tests consisted of 1RM strength of the bench press and leg press, a 30 s Wingate, bench press peak power and peak velocity, and jump height peak power, and peak velocity. Body composition variables include total body and segmental Dual-Energy X-ray Analysis (DXA), multi-frequency bioelectrical impedance (MFBIA), Single Frequency BIA (SBFIA), Bismene- pendase Spectrometry (BIS), Skinfold thicknesses, limb circumferences, and diagnostic ultrasound (US). RESULTS: Significant increases in strength and power ($p<0.02$) were observed for all measurements with the exception of Wingate variables ($p>0.09$). Significant positive relationships were observed for MFBIA fat mass (FM) and MFBIA percent fat (%Fat) ($r>0.50$, $p<0.03$) for bench press velocity as well as for DKA trunk lean mass and leg press 1RM ($r=0.576$, $p=0.012$). Significant negative relationships were discovered for skinfold thicknesses of the suprailiac and vertical jump height ($r=-0.507$, $p=0.032$) as well as fat free mass and leg press 1RM ($r=-0.711$, $p=0.001$). CONCLUSION: Changes in body composition variables (FM, FM%, %Fat, etc.) measured by different methods appear to produce varying relationships with performance variables after resistance training. An increase in fat measured by MFBIA appears to be associated with an increase in bench press velocity and an increase in trunk lean mass measured by DKA may predict an increase in leg strength. Also, a loss in subcutaneous hip (Skinfold) and thigh (US) fat may increase both vertical jump height and lower body strength, respectively. Thus, relationships between changes in body composition and performance after a resistance exercise intervention are dependent on both the method used as well as the variables being analyzed. This study was supported by MusclePharm Corporation.

ABSTRACT

Relationships between changes in performance and body composition variables after a ten-week resistance training intervention are unclear as to what body composition methods are related to which performance body composition variables from various devices and performance is still unclear. Specifically, it is unclear as to what body composition methods are related to which performance variables when looking at changes during an exercise intervention. Therefore, the purpose of the current investigation was to compare changes in performance to changes in body variables when looking at changes during an exercise intervention. Thus, the purpose of this study was to measure changes in body composition and performance during a ten-week resistance training intervention. Research dating back several decades has identified that body composition is related to athletic performance. Specifically, fat may increase both vertical jump height and lower body strength, respectively. Thus, relationships between changes in body composition and performance after a resistance exercise intervention are dependent on both the method used as well as the variables being analyzed. This study was supported by MusclePharm Corporation.

METHODS

Participants

Eighteen trained men (age: 25.8 ± 4.3 years; height: 176.7 ± 5.0 cm; weight: 80.3 ± 2.6 kg) completed this study. To be eligible, each participant must have performed resistance training regularly (3+ days/week) for 30+ minutes per day for at least 1 year. Additionally, subjects needed to be able to bench press their body weight and to squat 1.5 times their body weight. Exclusion criteria included: major medical conditions or disorders especially those that may affect strength training, kidney or liver function, smoking, and chronic medication use that may affect kidney or liver function. All subjects provided written, informed consent prior to testing and all testing procedures were approved by an Institutional Review Board.

EXPERIMENTAL DESIGN AND METHODS

Weeks 1-8 consisted of one muscle hypertrophy oriented workout consisting of leg press (LP), bench press (BeP), barbell back squat, chest support row, overhead press, pulldown, dips, bicep curl, and tricep extension. Testing consisted of 3 sets of 6-12 repetitions, one power day consisting of barbell back squat and bench press performed for 5 sets of 2-5 repetitions with a goal of high velocity of movement, and one strength day consisting of 3 sets of 1-5 repetitions at 85-100% 1-repetition maximum (1RM) intensity. Following the resistance exercises on the strength day, participants performed 2-3 sets of 10-30s Wingates with 2-4 minutes rest on a cycle ergometer. Participants rested 48-72 hours between each training day, and 30-120 days between sets on the hypertrophy day or 2-5min between sets on the power and strength days. During the overreach week, participants performed high volume workouts Monday through Thursday similar to the hypertrophy oriented workouts performed during weeks 1-8, with performance testing conducted on Friday. The taper week consisted of one power day on Monday and then a strength and power day on both Wednesday and Friday, which were performed at low volume.

RESULTS

Significant increases in strength and power ($p<0.01$) were observed for all measurements with the exception of Wingate variables ($p>0.09$). Significant positive relationships were observed for MFBIA fat mass (FM) and MFBIA percent fat (%Fat) ($r>0.50$, $p<0.03$) for bench press velocity as well as for DKA trunk lean mass and leg press 1RM ($r=0.576$, $p=0.012$). Significant negative relationships were discovered for skinfold thicknesses of the suprailiac and vertical jump height ($r=-0.507$, $p=0.032$) as well as fat free mass and leg press 1RM ($r=-0.711$, $p=0.001$). CONCLUSION: Changes in body composition variables (FM, FM%, %Fat, etc.) measured by different methods appear to produce varying relationships with performance variables after resistance training. An increase in fat measured by MFBIA appears to be associated with an increase in bench press velocity and an increase in trunk lean mass measured by DKA may predict an increase in leg strength. Also, a loss in subcutaneous hip (Skinfold) and thigh (US) fat may increase both vertical jump height and lower body strength, respectively. Thus, relationships between changes in body composition and performance after a resistance exercise intervention are dependent on both the method used as well as the variables being analyzed. This study was supported by MusclePharm Corporation.

CONCLUSIONS

While there appears to be clear relationships between changes in body composition and performance, the exact effect of the variables on each other is still unknown. Different body composition methods and variables appear to relate differently to changes in performance variables and the larger the magnitude of change (performance and/or body composition) the greater the relationship. Future research consider testing the same body composition methods over a longer duration with larger changes.