38. SWACSM Abstract

Understanding Muscle Power Decline Through Cross-sectional and Longitudinal Analyses of Elite and Masters Track & Field Data

BRANDON PFEIFER, MICHAEL HALL, MEGHAN CARLISLE, ROBERT D. HYLDAHL

Hyldahl Research Lab; Exercise Science; Brigham Young University; Provo, UT

Category: Undergraduate

Advisor / Mentor: Hyldahl, Robert (robhyldahl@byu.edu)

ABSTRACT

Sarcopenia, the loss of muscle mass and function with age, is associated with increased morbidity and mortality. Muscle power, which can be defined as the force a muscle can exert quickly (power = force × velocity), has the greatest impact on mobility in geriatric populations. Loss of muscle power has been well-established among the elderly (≥60), but studies suggesting the age at which muscle power decline begins are lacking. **PURPOSE**: This study seeks to determine the extent of muscle power decline in middle-aged populations (40-60) through data analysis of masters and elite track and field athletes. **METHODS**: Four track and field events were selected based on maximal power output and minimal skill requirement: the 100m dash, long jump, high jump, and triple jump. Elite and masters athlete data were gathered from the World Masters Outdoor Championships and the IAAF World Athletics Championships (17,945 total individual results). Data was analyzed by fitting individual and group results to quadratic and linear models. **RESULTS**: Average age of peak performance in all events ranged from 27.0 years for men's high jump to 29.3 years for women's triple jump, though the difference was not statistically significant. The average rate of decline from age of peak performance to end of career (39±2.6 years) for elite longitudinal data ranged from .49% per year for women's 100m dash to 1.01% per year for women's long jump. The average rate of decline for the cross-sectional masters data ages 35-60 ranged from .55% per year for men's 100m dash to 1.04% per year for women's long jump. The average rate of decline from 35-100 ranged from to .92% per year for women's high jump to 1.36% per year for women's 100m dash. Elite longitudinal data was better modeled by a quadratic model (mean R-squared=.72±.19) than a linear model (mean R-squared=.68±.20). Cross-sectional masters data from age 35-100 preferred a quadratic model over a linear model ($p<.01$), while cross-sectional data from 35-60 favored a linear model ($p=.25$). **CONCLUSION**: Results indicate that muscle power decline begins with an exponential decrease in the early 30s, then declines linearly until approximately age 60, when it again becomes exponential. This pattern of decline provides a basis for further research on power decline pathophysiology and preventive measures starting in the 30s.