

CONCLUSION: These results demonstrate that DOM and NDOM KF and KE total work and unilateral H:Q endurance ratios have acceptable intersession reliability in healthy young adults. Future work will examine clinical utilization of isokinetic unilateral H:Q endurance ratios, in addition to H:Q strength ratios, to gain a more comprehensive isokinetic evaluation of patient KF and KE functionality.

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Can Total Body Composition Be Used As A Predictor Of Cardiorespiratory Fitness In The Absence Of Cardiometabolic Diseases?

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Maximal oxygen consumption (VO_{2max}) is an important measure of cardiorespiratory fitness and can identify individuals at risk for chronic illnesses, primarily cardiovascular disease. While VO_{2max} has been associated with body fat percentage (%BF) or fat free mass, most analyses do not take into account total body composition as defined by %BF, fat free mass index (FFMI - a height-adjusted measure of muscle mass), visceral adipose tissue (VAT), and bone mineral content (BMC).

PURPOSE: To determine if total body composition predicts cardiorespiratory fitness in healthy adults and report if this relationship exists in young and older adults.

METHODS: Forty-three healthy individuals ($n = 35$ male; $n = 8$ female, Age 31.95 ± 9.36 years, BMI 25.01 ± 3.35 , %BF 19.54 ± 5.78 , VO_{2max} 45.41 ± 7.71 ml/kg/min) were screened in a clinical trial and retrospectively examined. All participants completed a full body DEXA scan and a standardized multistage treadmill test to determine VO_{2max} . A multiple linear regression analysis was performed to examine the relationship between total body composition and VO_{2max} . Since there is an established relationship between age and cardiorespiratory fitness, the regression analysis was also dichotomized by age (≤ 35 , >35). An *a priori* alpha level of ≤ 0.05 was used to determine statistical significance.

RESULTS: The multiple regression model did not show an overall significant effect, $F_{(4, 38)} = 2.466$, $p = .061$, $R^2 = .206$. For participants <35 years old, this relationship did not change ($r = .334$, $p = .509$). However, for those older than 35 years of age, the model did show a statistically significant, $F_{(4, 6)} = 16.504$, $p = .002$, $R^2 = .917$, and strong effect ($r = .957$). Significant predictors of VO_{2max} were %BF ($\beta = -0.751$, $p = .008$) and BMC ($\beta = 0.012$, $p = .002$).

CONCLUSIONS: Total body composition, defined as FFMI, %BF, VAT, and BMC, does not predict VO_{2max} in a small cohort of healthy adults between the age of 21-60 years without cardiometabolic diseases. However, there was a strong relationship between total body composition and VO_{2max} in participants older than 35 years, with the strongest predictors being BMC and %BF. This study highlights the importance of body composition for cardiovascular health, especially in mid- to later-life individuals.

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Cardiometabolic Indicators Of Excess Physiological Stress In A Professional Bodybuilder Detected Exclusively During Fasted Evaluation

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Contest preparation for competitive bodybuilders involves the compounding of substantial training loads with extreme dietary restriction. Insufficient data characterize the acute effects of this behavior on daily cardiometabolic parameters.

PURPOSE: To identify markers of training stress apparent during the final 2 weeks of professional contest preparation.

METHODS: A professional female competitor underwent 40 testing sessions during the final 14 days prior to an IFBB (International Federation of Bodybuilding and Fitness) contest. Data were collected thrice daily: fasted within 30 minutes of waking, midday, and in the evening after the last meal. Each testing session was performed by the same administrator and completed in the following order: pulse oximetry (Innovo Medical, USA), heart rate and blood pressure (Omron Healthcare, Japan), blood glucose (Keto-Check, USA), and breath ketones (Ketonix, Sweden). Linear regression analyses evaluated relationships between phase of contest preparation and cardiometabolic outcomes.

RESULTS: The subject was 29 years old; across the 14-day period, mean bodyweight was 45.0 ± 0.8 kg and BMI was 19.9 ± 0.4 kg/m². Morning testing began at $7:56am \pm 31.8$ minutes. Midday testing was at 12:00pm. Evening testing occurred at $8:54pm \pm 24.6$ minutes. As contest preparation progressed, cardiometabolic values measured in the morning exhibited change. With each successive day, bodyweight decreased ($\beta = -0.191$; $p < 0.001$; 95% CI = -0.220 to -0.161), heart rate increased ($\beta = 1.270$; $p = 0.010$; 95% CI = 0.362 to 2.179), systolic blood pressure decreased ($\beta = -0.763$; $p = 0.003$; 95% CI = -1.204 to -0.321), and pulse oximetry displayed a trend of reduction ($\beta = -0.081$; $p = 0.078$; 95% CI = -0.173 to 0.011). No changes were detected in diastolic blood pressure ($p = 0.892$), blood glucose ($p = 0.668$), or breath ketones ($p = 0.764$). During midday and evening testing, no relationships were observed with any tested parameter ($p > 0.100$).

CONCLUSIONS: The components of cardiovascular function that were sensitive to progressive nutritional restriction and training load were heart rate, systolic blood pressure, and pulse oximetry. In competitive environments that place athletes at risk of overtraining syndrome, it may be prudent to recommend daily monitoring of these variables in a fasted state.

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Associations Between Lean Mass, Muscular Strength, Muscle Quality And Physical Function In Middle-aged Women

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The determinants of physical function are not well characterized among middle-aged women.

PURPOSE: The primary aim of this study was to determine the strength of the associations between lean mass, muscular strength, muscle quality, and physical functional ability in a cohort of middle-aged women. The secondary aim was to determine the measure of muscle quality most highly associated with physical function.

METHODS: Middle-aged women ($N=111$, age = 53.1 ± 6.2 years) were assessed for body composition (via dual energy x-ray absorptiometry), physical activity (via accelerometer), and physical function (via Transfer Task [TR], 30-Second Chair Stand [30-CS], 6-Minute Walk Test [6MWT], 8-Foot-Up-And-Go). A lower body physical function composite score (PFCS) was then calculated. Lower body strength was measured using isokinetic dynamometry for isometric knee flexion and extension at 60 degrees, and isokinetic flexion and extension at 60 degrees/second and 180 degrees/second. Muscle quality was defined as muscular strength normalized for upper leg lean mass and calculated using: 1) isometric knee flexion and extension at 60 degrees (MQ-ISO), 2) isokinetic knee flexion and extension at 60 degrees/second (MQ-KN60) and 3) isokinetic knee flexion and extension at 180 degrees/second (MQ-KN180).

RESULTS: The sample had an average body mass index of 26.3 ± 5.5 kg/m², percent body fat of $38.0 \pm 8.1\%$, and completed 8177 ± 3329 steps/day. Partial correlations, controlled for age and average steps per day, found MQ-KN60 to be most highly associated with PFCS ($r=.43$, $p<.001$). Hierarchical linear regression found that 1) age, average steps per day, and MQ-KN60 were independently associated with PFCS, explaining 3%, 18.1% and 14.3% of the variance, respectively ($p < .001$), and 2) age, average steps per day, MQ-KN60 were significantly associated with TR, 30-CS, and 6MWT (all $p \leq .01$).

CONCLUSION: In this sample of active middle-aged women, MQ-KN60 and PFCS were most strongly associated. This data provides insight into relevant measures to consider when examining the independent contributors to physical functional ability women aged 40 – 64 years.

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Longitudinal Changes In U.S. Army Physical Fitness Test Performance

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U.S. service members are required to meet stringent fitness standards applicable to the military branch of service. The U.S. Army has developed assessments to ensure Soldiers meet these standards, and evaluation of these assessments requires an understanding of changes in performance over time.

PURPOSE: Evaluate longitudinal (6-18 months) changes in Army Physical Fitness Test (APFT) performance for Soldiers who passed or failed the baseline APFT.