

Association between Total Body Composition and VO₂max in Individuals with Mid-Spectrum Chronic Kidney Disease

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ABSTRACT

Total body composition (TBC), a measure of body fat percentage (%BF), lean body mass (LBM), and bone mineral content (BMC), can be used as a predictor of cardiovascular fitness. Prior studies have established a relationship between TBC and VO₂max in healthy individuals over 35 years of age. However, this relationship is poorly understood in chronic disease populations. **PURPOSE:** To assess the relationship between TBC and cardiovascular fitness in a clinical population of adults with mid-spectrum (stages G2, G3a, and G3b) chronic kidney disease (CKD). **METHODS:** A cross-sectional analysis was conducted among 24 subjects diagnosed with mid-spectrum CKD. Nine males and 15 females with an average age of 62.25±9.2 years and a glomerular filtration rate (GFR) of 54.38±9.04 ml/min/1.73m² completed the study. Subjects completed a health screening, dual-energy x-ray absorptiometry (DEXA) scan, and underwent VO₂max testing on a treadmill using a modified Bruce protocol. Normality tests, descriptive statistics, Pearson's correlations, t-tests, and ANOVAs were conducted in SAS v.9.4. **RESULTS:** The average %BF was 36.28±8.47%, LBM was 117.16±31.32lbs., BMC was 2308.74±735.19g., and VO₂max was 20.13±5.04ml/kg/min. VO₂max was positively correlated with BMC and LBM (r=0.65, p=0.001 and r=0.75, p<0.001, respectively) and negatively correlated with %BF (r= -0.80, p<0.001). Individuals in later stages of CKD had lower LBM, BMC, and VO₂max (p=0.017, p=0.001, and p=0.007, respectively), yet there was no association of CKD stage with %BF or age (p=0.210 and p=0.107). **CONCLUSION:** TBC was found to be significantly associated with cardiovascular fitness in the study sample. Higher BMD and LBM values were associated with higher VO₂max whereas higher %BF was associated with a lower VO₂max in individuals with mid-spectrum CKD. Progression of CKD stage was associated with lower LBM, BMC, and VO₂max values, indicating a graded effect of CKD stage on cardiovascular fitness.