Contribution ID: **283** Type: **Poster**

Use of deuterium dilution technique in the assessment of sarcopenic obesity in urban Jamaican elderly

Introduction: Diagnosis of sarcopenia in the elderly, which is a reduction of muscle mass and muscle function and a major cause of frailty and disability, is not universally defined. Age-related increase in adiposity can also potentiate risk of cardiometabolic disease. Different techniques have been used to estimate muscle mass depending on cost, availability and portability. Lean body mass (LBM), measured using deuterium dilution technique (D2O), a relatively cheap and portable method, may be a surrogate for muscle mass. We aim to use this method with measurements of muscle function to assess sarcopenic adiposity.

Method: The study was non-randomized with non-probabilistic sampling of free living participants. LBM and fat mass (FM) were measured using DXA and D2O with saliva collection. These variables and DXA appendicular lean mass (ALM) were adjusted for height (kg/ht2) to give ALMI, LBMI and FMI. Functional measurements were: 6-metre walk speed, 6-minute walk distance (6MIN-WALK), and handgrip force using a dynamometer. Two frequently used algorithms were used for sarcopenia diagnosis: the European consensus (EC) by Cruz-Jentoft etal (2010) and an International consensus (IC) by Morley et al (2011). Unpaired t-test, ranksum test and regression models were used to explore sex difference and association of body composition indices with measures of function controlling for age and sex.

Results: Participants were 56 females and 54 males, aged 60 to 80 years. LBMI and ALMI were significantly correlated (r-squared = 0.84, p = 0.000). Both were positively related to handgrip (p =000) but not related to the walk tests. FMI and BMI were negatively associated with the walk tests. The 6MIN-WALK was low in 35% of the participants compared to less than 10 % for the other functions. Using ALMI, 7 and 6 participants were classified as sarcopenic according to both IC and IS respectively, with 5 overlapping. D2O-LBMI was normal in all participants assuming similar cut points based on reported BIA-LBMI. Using the lowest quintile from the present data as a cut point for low D2O-LBMI (<15.25), 7 participants were sarcopenic by EC and 11 by IC: 50% of both were sarcopenic using ALMI.
In all participants, 51% were preobese and obese and 5% underweight. Among those estimated as sarcopenic: BMI was normal except one underweight; none above FMI 75th percentile; 45% had waist circumference > 83 cm and 63% were hypertensive.

Conclusion: Low sarcopenic cases (5% –10%) did not allow for analysis by sex (eg ROC analysis) to conclude if D2O-LBMI is a good surrogate for muscle mass. However, the results indicating that both D2O-LBMI and D2O-FMI have significant effects on overall muscle function suggest their potential use in diagnosis; but a lager study and diagnostic criteria cut points based on younger healthy Jamaicans are needed to improve this investigation. Fat infiltration of muscle may explain low 6MIN_WALK in ˜30% of the participants. Abdominal obesity and not obesity according to BMI and FMI could have additive negative health effects with sarcopenia.

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Session Classification: Poster Session 3

Track Classification: Assessment