Reviewer’s report

Title: A Randomised Controlled Intervention Study Investigating the Efficacy of Carotenoid-rich Fruits and Vegetables and Extra-Virgin Olive Oil on Attenuating Sarcopenic Symptomology in Overweight and Obese Older Adults During Energy Intake Restriction: Protocol Paper.

Version: 0 Date: 31 Jul 2017

Reviewer: David Scott

Reviewer’s report:

This is a well-written study protocol for an interesting RCT exploring effects of carotenoids and extra-virgin olive oil on maintenance of skeletal muscle mass and function in overweight and obese older adults during energy restriction. While the study has several limitations including a small sample size and inability to determine individual effects of carotenoids and olive oil, the results have the potential to inform guidelines for weight loss in the growing obese older adult population. I have the following comments:

1. My major comment is related to the choice of control group, specifically the inclusion of polyunsaturated fatty acid-based oils. Several studies have demonstrated that PUFAs are associated with improved muscle mass and function, potentially through effects on muscle protein synthesis and/or inflammation (eg. Smith GI et al. Dietary omega-3 fatty acid supplementation increases the rate of muscle protein synthesis in older adults: a randomized controlled trial. Am J Clin Nutr. 2011;93(2):402-12; Lalia AZ et al. Influence of omega-3 fatty acids on skeletal muscle protein metabolism and mitochondrial bioenergetics in older adults. Aging (Albany NY). 2017;9(4):1096-129; Smith GI et al. Fish oil-derived n-3 PUFA therapy increases muscle mass and function in healthy older adults. Am J Clin Nutr. 2015). Is it possible the control group will therefore also benefit from this diet and so effects of the high-carotenoid EVOO diet may be underestimated?

2. Abstract: provide the number of participants to be recruited.

3. While whole-body scans are important for assessing changes in lean and fat mass, decreases in bone mineral density are an important consequence of weight loss for older adults. Was any thought given to performing total hip and lumbar spine DXAs (given these are the clinically relevant sited for osteoporosis)?

4. Instead of IPAQ, why not use the Physical Activity Scale for the Elderly (PASE), which is likely more relevant for this population?

5. The SARQoL is a sarcopenia specific QoL questionnaire designed for community-dwelling older adults - this would seem to be worth including as a measure of QoL in addition to SD-36.

6. Please clarify whether food is provided to participants, or if they are required to obtain their own food based on diet guidelines.
7. The manuscript alternates between tenses - past and future.

8. You estimated sample size based on a medium effect size; can you give this in terms of differences in muscle mass between groups (eg. in kg)?

9. BMI obviously has numerous limitations particularly for older adults? Did you consider using obesity cut-points based on body fat percentage to determine eligibility? Individuals with high BMI due to high muscle mass may experience different responses to the intervention to those we would consider typically obese.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

Unable to assess

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:

Acceptable

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