Reviewer's report

Title:A systematic review of the evidence that brain structure is related to muscle structure or function or that brain function is related to muscle structure in humans.

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Reviewer: Xiaowei Song

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The objective of this article is to review evidence on brain-muscle relations in humans with healthy ageing. The authors conducted a literature searched using several major databases including the Medline on November 30th 2011, supplemented by citation searches. The review is made based on a final set of 55 original research records published between 1994 and 2011.

Overall, it can potentially be an interesting paper that provides novel information to better understanding possible associative and/or predictive relationships between brain structure (e.g., total volume, white matter hyperintensity, frontal gray matter volume) and muscular structure and function (e.g., lean mass, gait speed, grip strength). The work can potentially contribute to the body of the literature on ageing and would be of some interests of the BMC readers.

However, the current version of the manuscript needs much work. My concerns are listed below.

Major

1. If the paper is to review evidence on brain-muscle relations in ageing, it needs to be focused more on searching for relevant evidence, instead of proving proof of specific hypotheses as stated in the paper. There exist different theories and hypotheses on how we age and why people vary in the process of ageing. The proposed hypothesis may serve as one explanation to interpret the research findings. Alternatively, other hypotheses may also be applicable (e.g., refer a most recent paper by Mitnitski et al Biogerontology 2013 Dec;14(6):709-17: Biological ageing at the system level can be expressed by deficit accumulation in multiple organ systems, reflecting the reduction in the pace of the recovery).

2. If the paper is to review evidence on brain-muscle relations, then the results should be presented around this. This is not the case in the manuscript. For example, the contents in the first two paragraphs of the Results section did not report any results.

3. In fact, portions of the data reported here were produced by the authors of the present article, through analyzing data of the original studies under this review. In this regard, it is difficult to tell whether the current manuscript is more like a secondary analysis study or a systematic literature review as it is claimed to be.
Minor

1. The title of this article is too long and difficult to follow. It also did not directly address the key points of the article, e.g., “with ageing”, “for changes”, and “limited evidence”.

2. The literature under review is not up to date (i.e., by 2011). An update for including publications during the past couple of years from 2011 to 2013 is required.

3. Tables 2-4 need to have more sensible titles (e.g., “sent” does not make sense).

4. It was stated in the article, “This systematic review identified studies … in healthy children and adults”, but the article is basically on ageing and most of the research articles under this review involved older adults, i.e., with a mean age of ~70 years.

5. Result presentation needs to be better structured, emphasizing key findings and also balancing weights for various sections. Summarized the main findings using figure/tables may also help.

6. Conclusions drawn in the paper did not seem to have properly wrapped up the review. Conclusions and the major findings sometimes contradicted each other. For example, “There exists only limited evidence about the relationship between brain structure and muscle structure” versus “Relationships between brain structure and physical function are well documented.”

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests