Reviewer's report

Title: Changes in the body posture of women occurring with aging

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Reviewer: Manuel E. Hernandez

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In the study, the authors first characterized the changes in posture seen in older women, over 60 years of age, when compared to young women (age 20-25 years), and then further examined postural measure differences between three age groups (60-70, 71-80, and 81-90 years). Photogrammetry was used to measure 14 postural measures, while standing. Differences in the slope of the upper thoracic spine, depth of thoracic kyphosis, the angle of lumbar lordosis, and asymmetry of the shoulder blades were found across the three decades. The authors are commended for their potential important contributions in an important area of research. However, there are several issues that must be first addressed.

Major Compulsory Revisions:

1. In the abstract and methods, further details need to be provided on the methodology used. Was the photogrammetry automated? If so, what software was used? How are the angle of lumbar lordosis and thoracic kyphosis explicitly defined? As the manuscript is currently written, there are insufficient details for the reader to replicate the study, which must be further addressed.

2. In the abstract, the authors claim that: “all [individual slope curves] show an increase with age”; however, by using the Mann-Whitney U test, we can only say that one group has a different value than the other. Thus, authors should rephrase their findings to accurately reflect this limitation in their abstract, results, and discussion.

3. In the abstract, the authors claim that an increase in the slope of the upper thoracic spine, the depth of thoracic kyphosis, the angle of lumbar lordosis, and asymmetry of the shoulder is observed with age, but by using the Kruskal Wallis ANOVA test we only know that one of the groups is different from the others. Thus, the authors should explore the use of regression to make this claim, or rephrase their summary. The same applies to the Results and Discussion.

4. Introduction. The authors should take care to appropriately acknowledge prior work looking at the changes in posture in older adults [1-5], which this study builds upon. The current manuscript does not place this study in the context of prior work, and does not focus on key factors associated with changes in posture, such as pain [6], muscle strength [7], and obesity [8].

5. Methods. Given the significance of confounding factors such as pain, strength, and obesity (i.e., body mass index, or weight) on posture, were any of these
measured in the current study? If not, please note this limitation of the study.

6. Methods. Expand upon “The study was conducted according to generally accepted principles.” Does the study follow the same exact procedure as one of these previously published studies? If so, be explicit.

7. Methods. How reliable and consistent are the measures used in this study? Why were these measures selected?

8. Methods/Results. Where data transformations on the selected measures considered for achieving normal distributions?

9. Results. The authors should comment on the clinical significance of their findings. Readers would benefit from a comparison of the observed measures with clinically significant deviations in posture, where possible.

10. Discussion. How do reduced flexibility, muscle contraction, and strength affect the cerebral cortex? How is it relevant to the current study?

11. Discussion. The sentence: “As a result of diminishing muscle strength, elderly people subconsciously try to balance themselves with supportive tools” is unclear: are the authors referring to balance assistive devices such as canes or walkers or intrinsic strategies such as stiffening, or co-contraction. Please clarify.

12. Overall, as currently written, the discussion does not communicate to the reader the significance and/or novelty of the study. With some reorganization and rewriting this may be improved. In addition, a few claims are made at the end of the discussion:

“Both the change in the slope of the whole body, as well as changes in the slope of individual sections of the spine, will affect the abnormal load balance and will change the parameters, which in turn may contribute to an increase in the frequency of falls in the elderly. Asymmetries in the spine are permanent changes in adults, and if not prevented, may deepen, which may cause occurrence of pain.”

Which should include cited references.

Minor Essential Revisions:

1. In the abstract please define any acronyms before presented for the first time for improved clarity to the reader.

2. Introduction. Readers would benefit from having the significance of this work outlined for them by the author at the end of the introduction.

3. Methods. Readers would benefit from a more explicit definition of the measures used in this study, in particular for the angle of lumbar lordosis and thoracic kyphosis.

4. Methods/Results. Units of measurement should also be provided in the methods and/or results, in addition to the tables.
5. Methods. U Mann-Whitney should be rewritten as Mann-Whitney U.

6. Methods. ANOVA Kruskal-Wallis should be rewritten as Kruskall-Wallis ANOVA.

7. Methods. Please specify what groups are used for the Kruskall-Wallis ANOVA test.

Discretionary Revisions:

1. In the abstract use anatomical reference for angle, rather than ALPHA, BETA, and GAMMA for improved clarity to the reader. Instead of using group I and II, use meaningful labels such as Young Women and Older Women.

2. Methods. There is no need to have the specific resolution number from the bioethics committee of the medical faculty of the University of Rzeszow, I would recommend removing “(Resolution No... )”.

3. Methods. Readers would benefit from a more explicit definition of the measures used in this study, thus, I would recommend the use of an illustration or photo to describe how the measures were calculated.

4. Discussion. The sentence “The center of gravity moves forward, which results in tilting the whole body towards the same direction,” may be rewritten as: “Tilting the whole body forward results in moving the center of gravity forward in the same direction,” but should probably be removed, as it does not seem to contribute to the discussion of increased thoracic kyphosis.


7. Sinaki M, Itoi E, Rogers JW, Bergstralh EJ, Wahner HW. Correlation of back extensor strength with thoracic kyphosis and lumbar lordosis in

**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:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests