Author's response to reviews

**Title:** Aqua walking as an alternative exercise modality during cardiac rehabilitation for coronary artery disease in older patients with lower extremity osteoarthritis

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**Author's response to reviews:**

Reviewer reports:

(Reviewer 1): This study examines the effect of aqua-walking versus traditional over-ground walking on coronary artery disease (CAD) and cardiorespiratory fitness in older adults with osteoarthritis in the lower extremity and it demonstrates that aqua-walking is a feasible alternative exercise modality in this kind of patients. Some observations:

- In Methods section (line 13) it is declared that study patients had undergone PCI for CAD. In Discussion section (line 28) it is declared that this is the first study to demonstrate the benefits of AW in patients treated with PCI or at risk for CAD. So, have you considered rehabilitation in secondary or also in primary prevention?

Authors’ response:

Thank you for your valuable comment. We have corrected the erroneous expressions. First of all, we could consider the AW program for secondary prevention and expand the indication to primary prevention.

**Discussion:**

However, this study demonstrated the beneficial effects of the AW program in older individuals who underwent PCI.
- How long after PCI have you started physical activity sessions?

Authors’ response:

Thank you for your valuable comment. Each cardiac rehabilitation program started 2 to 4 weeks after index PCI.

Methods:

Individualized CR programs were performed 2 to 4 weeks after index PCI.

- Were TW-patients OA-patients? There seems to be a contradiction between Methods section and Limitation section about randomized patients. Could you please explain this aspect more clearly?

Authors’ response:

Thank you for your valuable comment. All patients had OA. In the limitations section, some sentences were vague and unclear. Thus, we deleted such sentences.

Limitations:

It could be difficult to generalize our findings to all patients, because performing AW needs specialized facility and members.

- There seems to be another contradiction between Results and Discussion sections: in the first one it is declared that in the study population there was a male dominancy; in the second one (line 28) population is said to be female. Could you please explain this point more clearly?

Authors’ response:

Thank you for your valuable comment. Our study population had a male sex dominancy. We have corrected the sentence in the Discussion.
Discussion:

Furthermore, the participants in the present study were older patients (aged >65 years) with lower extremity arthritis and thus are likely to generate smaller improvements in CRF than younger, healthier, male subjects.

- Have you any data about the comparison of study patients VO2 peak value and predetermined VO2 peak value?

Authors’ response:

Thank you for your valuable comment. In Table 4, we compared the VO2 peak values among the groups before and after the exercise programs. Unfortunately, we do not have data on the predetermined VO2 peak value. Our patients had lower extremity OA and underwent submaximal cardiopulmonary exercise test, which made it difficult to predict the predetermined VO2 peak value.

- It is known that VO2 peak is a parameter that has interpretative limits related to the fact that it can be very different from VO2 max in non-maximal tests. Have you any data on anaerobic threshold?

Authors’ response:

Thank you for your valuable comment. In our study, the peak VO2 value was defined as the maximal averaged VO2 value attained at end-exercise after the anaerobic threshold was reached. The reviewer pointed out the important difference in VO2 peak and VO2 max values. In such a situation, an anaerobic threshold could be used. Unfortunately, we did not have data on the anaerobic threshold.

Methods:

The peak VO2 value was defined as the maximal averaged VO2 value attained at end-exercise after the anaerobic threshold was reached.

- What about perceived exercise intensity during physical activity sessions? Have you used any scale such as the Borg scale?
Authors’ response:

Thank you for your valuable comment. We used the Borg scale of rated perceived exertion during every exercise session. We recommend the range of 11 to 14 (somewhat difficult).

Methods:

Further, we employed the Borg scale of rated perceived exertion (RPE) during exercise and used the range of RPE values of 11 to 14 for every exercise session.

(Reviewer 2): REVIEWER COMMENTS

Comment #1

Page 4, row 13. Participants are described as "with limited ambulation". Have you objectively measured disability? If yes, please present methods and results. If not, you could better describe subjectively the walking limitation: Were all participants free of self-reported difficulty walking for one-quarter mile? Do all participants have any difficulty walking for one mile?

Authors’ response:

Thank you for your valuable comment. We totally agree with your opinion. Unfortunately, we did not check the distance of pain-free walking, etc. We enrolled patients with proven lower extremity OA with persistent pain, which altered their exercise capacity. We have inserted the following sentence to provide more detailed information.

Methods:

All patients with lower extremity OA and persistent pain, which significantly impair their functionality, activity participation, and quality of life, have been treated with pharmacological or non-pharmacological management.

Comment #2

Page 4, row 57. "... matched to the subject's functional capacity...": was the protocol individualized? Do you mean small increases in workload as described by the BSU/Bruce Ramp protocol? Please clarify.
Authors’ response:

Thank you for your valuable comment. The protocol was not individualized but described in the BSU/Bruce Ramp protocol. We have clarified the sentence.

Methods:

All participants underwent symptom-limited maximal exercise testing with small increases in workload matched to the subject’s functional capacity every 20 s, which was described in the BSU/Bruce Ramp Protocol.

Comment #3

Even though maximal cardiopulmonary exercise tests represent the gold standard for cardiorespiratory fitness (CRF) assessment, it has been described impractical for evaluating older and mobility-impaired adults (DOI: 10.1111/j.1532-5415.2004.52267.x; DOI: 10.1046/j.1532-5415.2001.4911247.x). Thus, several alternative submaximal walking protocols have been developed to estimate CRF. Since you use walking as training modality, have you assessed walking capacity by other walking tests? If yes, please present the data. If not, this issue has to be included in the Discussion as a potential limitation.

Authors’ response:

Thank you for your valuable comment, and we totally agree with your opinion. We have inserted such as a limitation. We did not assess the walking capacity using other walking tests. We must consider such methods for our next investigation.

Limitations:

Although maximal cardiopulmonary exercise tests are the gold standard for CRF assessment, they have been described as impractical for evaluating older and mobility-impaired adults [38]. Thus, several alternative submaximal walking protocols have been developed to estimate CRF. However, we did not assess the walking capacity using other walking tests. Thus, the CRF might have been over- or underestimated in our study.

Comment #4
Daily activities, particularly for mobility-impaired adults, rarely require maximal effort. Therefore, the ability to perform prolonged submaximal exercise (e.g. extended walking tests) is often more relevant to health-related fitness assessment. The effects of the Aqua-walking program proposed in this study could be more emphasized by considering submaximal walking testing.

Authors’ response:

Thank you for your valuable comment. We totally agree with you. We have inserted such in the Discussion.

Discussion:

Daily activities, particularly for mobility-impaired adults, rarely require maximal efforts. Therefore, the ability to perform prolonged submaximal exercises is often more relevant to health-related fitness. The effects of the AW program proposed in this study could be more emphasized by considering submaximal walking training.

Comment #5

Page 10, rows 33-35: Clinical meaning of the VO2 peak value improvement obtained. The VO2 peak value improvement obtained in the 24 weeks program may be relevant, not only because consistent with the results of a prior study in healthy elderly women, but also because a similar improvement predicted long-term prognosis in patients with CVD (DOI: 10.1016/j.amjcard.2008.01.023. and DOI: 10.1016/j.ijcard.2014.02.039). These comments and consistencies with the literature have to be included in the Discussion, to further emphasize the potential clinical meaning of the results you obtained.

Authors’ response:

Thank you for your valuable comment. We totally agree with you. We have inserted sentences in the Discussion.

Discussion:

The clinical meaning of the VO2 peak value improvement could be assumed. The VO2 peak value improvement obtained in the 24-week program may be relevant, not only because it is consistent with the results of a prior study, but also because a similar improvement predicted the
long-term prognosis of patients with CAD [23, 24]. Our study might emphasize the potential clinical meaning of the AW program in CR programs.

Comment #6

Page 10, rows 38-40: Meaningful change in physical function. In the Exercise Training Program section (page 5, row 57) you stated "...The TW group performed either treadmill or track walking of their own choice...". Do you have data on walking pace or distance during the program? If yes (even in a subsample), please present data. If not, please comment these considerations in the Discussion. In fact, improvement in walking distance or pace have been demonstrated to be strong independent predictors, and a greater guide to prognosis, than gains in VO2peak (DOI: 10.1016/j.amjcard.2008.01.023. and DOI: 10.1136/heartjnl-2015-309126). As suggested in Comment #5, these comments and consistencies with the literature have to be included in the Discussion, to further emphasize the potential clinical meaning of the results you obtained.

Authors’ response:

Thank you for your valuable comment. We totally agree with your opinion. Unfortunately, we did not have any data on the walking distance or walking pace. Thus, we have inserted such in the Discussion, per your suggestion.

Discussion:

Improvements in walking distance or pace have been demonstrated as strong independent predictors and a better guide in assessing the prognosis than the gains in the VO2 peak value. However, our study did not evaluate these variables. The main aim of our study was to evaluate the AW feasibility compared with the TW program.

Comment #7

Did you assessed rate of perceived exertion during the training sessions? If yes, please present the data in the Results.

Authors’ response:

Thank you for your valuable comment. We totally agree with your opinion. We used the rate of perceived exertion scale during the exercise training, with a range of 11 to 14.
Methods:

Further, we employed the Borg scale of rated perceived exertion (RPE) during exercise and used the range of RPE values of 11 to 14 for every exercise session.