Reviewer's report

Title: The effects of two weeks high-intensity interval training on fasting glucose, glucose tolerance and insulin resistance in adolescent boys; A pilot study

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Reviewer: Dalia El Khoury

Reviewer's report:

This manuscript addresses one important aspect to manage glucose homeostasis and insulin sensitivity of adolescent boys. Although this study is described as pilot study, many changes need to be introduced before being reconsidered for publication.

Overall, English editing is needed in different sections, and it is not clear why [glucose] and [insulin] are written in brackets.

Below are my comments on the different sections:

- Abstract: a background explaining the need for this study is missing. Many studies have been done on effects of training in youth on their cardiometabolic health. why this study is needed? In the Methods section, the characteristics of boys should be better highlighted: normal weight? obese? overweight? on line 20 (page 2), authors mention about VO2 max without explaining what it reflects. In the Results section, authors need to add info on: any comparison between indices at 20h and 70h POST? for the MMTT, what is the difference between baseline, 20h and 70h at the different time points for the different indices explored? authors need to add data on fitness; they are only reported glucose/insulin indices-related data. The conclusion is not based on findings from this study; the boys recruited for this study need to be better defined, whether they had normal baseline glucose and insulin levels or not and whether they were insulin resistant or not at baseline - accordingly, authors can then suggest for interventions on a larger sample size and on boys with elevated baseline insulin levels or with baseline insulin resistance. Since this is a pilot study, authors should indicate that future studies should be performed on a larger sample size of adolescents.

- Background: line 55 (page 3), what does "short duration sprint intervals" mean? need to be better defined. On page 4, lines 49 and 50, authors need to explain how 1 day is acute and 3 days is considered chronic. The definition of chronic varies among studies, and needs to be better supported in this study. Many more up to date articles are missing, and need to be added - such as Zguira et al, 2019's study on obese young adolescents, as well as Burns et al, 2019's, Marson et al, 2016's and Bea et al, 2017's meta analyses.

- Methods: In Participants, the inclusion and exclusion criteria of participants are missing: normal baseline insulin/glucose levels? normal baseline insulin sensitivity? normal weight or not, etc. Also, the age range for recruited boys needs to be defined. Even if this is a pilot study,
authors need to support why a sample size of 9 is good enough - sample size calculation needs to be shown. In Study design, why visits 1 and 2 were separated by 3-5 days? authors need to explain the selection of the numbers 20h and 70h POST. Page 6 line 32, authors need to cite a supporting article for how to conduct an MMTT; is 80g of glucose typically given in MMTT? Page 7, line 37, were participants asked to keep the same type/amount of physical activity the same before the different visits and exercising sessions? on page 8, lines 11-15, authors mention about blood being collected on each training day...this is suddenly mentioned and not previously described. and why authors need to account for changes in plasma volume following training? In data handling, tAUC and iAUC needs to be further described and discussed. In statistical analysis, ANOVA exploring effects of time and group for MMTT needs to be added, as previously discussed. Authors need to mention that both tAUC and iAUC will be analyzed. The sentence "all results are presented as P values, unless stated otherwise" is not clear; please rewrite and clarify. The correlation findings do not add any information. Authors need to clarify what these correlation analyses serve for and what they do inform us about.

- Results: very concise. Results need to be described in more details. It is unclear, page 9 line 7, how the range of BMI is 17.8 to 24.0 and 3 participants were classified as overweight. Why the range does not reflect their BMIs? did authors compare indices at 20h versus 70h? did authors compare indices between baseline, 20h and 70h at the different time points for the MMTT? this information needs to be added. Also, correlation analyses do not in my opinion add any valuable information, unless authors can explain the reason for performing these correlation analyses.

- Discussion: authors need to add more recent studies exploring cardiometabolic parameters in youth in responses to exercise. I have stated some examples in my comments on the Introduction section. How did authors reach their conclusion on page 10, lines 4-8 "Short duration...for future intervention work"?; what type of intervention work they are referring to? Authors need to specify whether a study on a larger sample size will be conducted considering the pilot nature of this study.

- Conclusion: authors are referring to the correlation analyses' findings without explaining what they do mean practically. The conclusion section needs to reflect the practical implications of the findings; not just repeat the findings of the study.

- Tables: table 1: ranges are usually expressed as number-number not as number to number; please adjust. In table 2, it is indicated that 20h POST includes the final training session-why so? and why this information was not mentioned in the methods' section? Also, please add to the footnote information on how P value was generated. Table 3: please explain in the footnote the stats analysis used to generate P value.

- References: good number; but more up-to-date articles need to be cited.

- Figures: figure 1: should also show the difference between baseline, 20h and 70h at the different time points. Figure 2: abbreviations should be defined in the footnote.

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.

No

**Are the conclusions drawn adequately supported by the data shown?**
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No

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