Review in:

Influence of 4-week lower extremity high-intensity interval training on energy metabolism and maximal oxygen uptake of elite swimmers.

I would like to congratulate the authors for the data they collected and this is an interesting study.

In my personal opinion, I believe it needs maximum improvement before it can be published.

The **abstract** is clear and includes the objectives, design, methods, variables, main results, and most relevant conclusion.

Comment 1:

Line 36: "Statistical analyses were conducted using SPSS (version 25.0)." It would be better to write that "ANOVA repeated measures was carried out to examine interaction effects with data analysis and significance level was $P < 0.05$." Please, correct it.

The **introduction** needs significant improvement to enhance clarity and flow, making it easier to read and helping the reader understand the topic.

General Comment:

In the first paragraph, consider introducing HIIT (High-Intensity Interval Training) by highlighting its application across various sports, including both team and individual, and emphasizing its effectiveness in enhancing aerobic fitness. In the second paragraph, discuss the body's energy systems and how HIIT influences them. The third paragraph can focus specifically on swimming, explaining how HIIT contributes to improved performance in swimmers. Finally, in the fourth paragraph, clearly state the purpose of the research and outline any assumptions made during the design of the study. The introduction should be concise and well-structured, with a total length of approximately 700 to 850 words.

In addition, you should pay attention to some techniques in the way you write in the text as indicated below.

Comment 2:

Line 65 – 67: "*Numerous studies* have reported the effectiveness of high-intensity interval training (HIIT) in enhancing swimming performance (Sperlich et al., 2010a)."

After you have mentioned numerous studies, you should put more than four references at the end of the sentence.

Comment 3:

Line 69 – 71: It is mentioned “Training within the near maximal range of 80% - 100% of maximal oxygen consumption (VO2max) or maximal heart rate (HRmax)”. However, the percentages of HRmax and VO2max are not equivalent. The percentage 80%–100% of HRmax corresponds to a lower percentage of VO2max. Unless you intended to refer to the same percentage range of HRmax and heart rate reserve (HRR). Please, clarify.

In **Materials and Methods,** methodology and techniques are adequate to reach the objectives of the study. While there are some details that are important.

Comment 4:

Line 167: “four females per group” Were these female participants' menstrual cycles recorded? We know from the literature that depending on the phase of the menstrual cycle, the follicular and luteal phases, women's performance is also affected. Of course, at this time the research was carried out and should be checked in its development in a future study.

Line 170 - 173: The body compositions of the participants are reported as the average but their standard deviation (±SD) is not reported. Please correct this.

The statistical analysis is described in detail and with great clarity but there are some questions such as:

Line 243: the program used was SPSS, version 25, Chicago USA, which is a statistical program and Microsoft Excel is an accounting program, which is not accurate in statistical analysis. Please clarify what was used for the reliability of the results.

Line 248: “$P < 0.01$ was considered highly significant”, It is not necessary to mention that; instead, reference should be made to the effect size, Cohen's η^2 index, and its interpretation, such as trivial (<0.2), small (>0.2 - 0.5), moderate (>0.5 - 0.8), large (>0.8).

The **results** are structured and are informative.

Comment 5:

In the tables, indicate the values, especially in η2 it should be evaluated. At the same time, check the values of η2 because in some parameters that I randomly calculated I found other values. Please do a detailed check of the results to be sure of the correct performance of the results.

Comment 6: Explain the notes at the bottom of every table and the legend format of figures at the bottom.

The **discussion** explains the results based on the literature and compare what was found in the present study with what exists in the literature.

Comment 7:

The discussion could be more in-depth by comparing the results of this research with previous ones and providing an explanation through the mechanisms that cause these adaptations.

Comment 8:

Towards the end of the discussion you should mention some limitations.

Comment 9:

The conclusions are linked to proposals and no values are mentioned because they have been mentioned above.