Reviewer’s report

Title: Investigation of Cardiopulmonary Exercise Testing Using a Dynamic Leg Press and Comparison With a Cycle Ergometer

Version: 1 Date: 28 Dec 2017

Reviewer: Spyridon Methenitis

Reviewer's report:

General Comment.

The study of Chrif et al., aimed to assess the feasibility of a dynamic leg press (DLP) for incremental cardiopulmonary exercise testing (CPET) and to compare the results with those obtained using a cycle ergometer (CE). In 24 young male participants they examine the cardiopulmonary responses, both under DLP and CE conditions. Even if this is a very interesting study, several considerations, especially methodological ones, are raised from the review. First of all, they conclude that the dynamic leg press was found to be feasible for CPET. However, cardiopulmonary responses during the DLP were significant lower that those during CE, and thus the question that arise is that if authors propose that DLP can replace CE? If this is what they propose, this is not true according to their results. So what is the significant value that this paper could add to the existing knowledge? In support of this, in the manuscript, and specifically at the 3rd paragraph, authors state that "Cardiopulmonary responsiveness, and in particular the applicability of such machines for estimation of peak and sub-maximal cardiopulmonary performance parameters during formal CPET, has not hitherto been investigated.". Indeed, this is true, but why it is important to investigate the possible use of leg press machine for the examination of the Cardiopulmonary responses? In addition, under the results of the present study, the use of the DLP for a CPET evaluations seems inappropriate, due to the fact that this test has significant difference from a standardized CE CPET. However, authors states that "The dynamic leg press was found to be feasible for CPET: the approach was technically implementable and all peak and sub-maximal cardiopulmonary parameters were able to be identified." The use of two different devices and methodologies and then comparing the results of them is not acceptable, unless the work and the stress that they induce are matched. In the manuscript, nowhere was described that the works and / or the induced stress of the two different test were matched. If this wasn't performed, it is a significant handicap of the paper. In addition, for such a statement some more adequate statistical analyses are needed. Additionally, there is an absence of any physiological base and / or explanation about the results of the present study, while a revision of the background section, will reinforce the value of this paper. Finally, there are numerous typos and grammatical errors throughout the manuscript. Authors should consider a throughout revision of the manuscript for proper grammatical and syntax corrections. In many
cases they are significant syntactical errors. The authors should proofread the document extensively prior to another submission.

Specific Comments

Abstract

Line 31. What authors mean with the "able-bodied"

Line 31. Please change the term "subjects" to "participants"

Line 31. "(mean ± standard deviation)" could be excluded from the abstract

Line 38. Please change the number from L/Min to ml/Kg/min throughout the manuscript

Line 40. "(DLP vs. CE, p = 6.7 × 10−6);". Is this true? Authors examined the p values at the level of 10-6? This is not necessary. Please change to "p=0.000"

Line 42. What is "viz."

Keywords

Most of the keyword are also in the title. Please change them according to the guidelines of the Journal

Background

Page 2 Line 7. Please delete the "populations".

Page 2 lines 8-10. These sentences need a rephrasing.

Page 2 lines 34-40. Why the investigation of Formal CPET using a dynamic leg press exercise devise is important for the applications for musculoskeletal training? And to whom? Please give a strong reason for this statement or re-phrase the whole paragraph.

Methods

Page 2 line 53. What authors mean with the "able-bodied"

Page 2. Do authors perform a power analyses? Please provide the actual power for each result.
Page 2 line 62. Authors states that participants performed the two test until their limits of tolerance within 48 hours. 48 hours is very short time interval for these 2 tests. Fatigue, metabolic and neuromuscular type, is known that may last up to 72-96 hours after such a test. Thus the very short time interval may affect negatively the results of the study, even if the study was a counterbalanced one.

Page 3 line 6. How many days or hours were kept between the familiarization session and the first test?

Page 3 line 7. Please change "and both of the exercise testing" to "and for both exercises".

Page 3 line 11. What is "(Sec.)"?

Page 3 line 14. Is it two different devices or actually it more accurate to use the term "for both methods"? The present study did not investigate the devises, but the methodology that could be used. Please consider to change it throughout the manuscript.

Page 3 2nd paragraph. A more analytically descriptions for both methods is needed here. Authors should describe analytically, what they have done to each methods in each stage. What are the criteria for the next stage and e.t.c. Furthermore, authors should provide evidence for the intraclass correlation coefficients (ICCs) that they have in each methods.

Page 3 line 39. "high-specification cycle ergometer was used"?

Page 3, What was the ICCs for the cardiopulmonary evaluations?

Page 3 Lines 58-62. What was the ICCs for the position and angular velocity of the pedals

Page 3 line 62. Please change the "The subject's total work rate P was estimated using the force and velocity data as follows:" to "The subject's total work rate (P) was estimated using the force and velocity data as follows:".

Page 4 line 13. Please change the "Here" to "Where the…..". Please provide the Units of measurements

Page 4. Please consider the right use of the terms in the text, or in the parenthesis. E.g. the "as possible to the target work rate Ptarget" should be changed to "as possible to the target work rate (Ptarget)"

Page 4 line 36. Please provide the ICCs for the methodology of the work rate estimation algorithm.

Page 5 line 7. Why authors use 1.4 as a factor and no someone else?

Page 5 line 53. In studies like this, for the absolute comparison of the results between two methods, additional statistics are needed, including Chi-Square Goodness of Fit Test , Pearson's
product moment correlation coefficient, intraclass correlation coefficient (ICC), standard error of measurements inter-assay coefficient of variation (CV), Bland & Altman 95% limits of agreements (LOA), standard error of the limits (SEL), 95% confidence interval for the limits of agreement (CILOA) and repeatability coefficient (RC), were employed as they previously proposed for this kind of research (Atkinson et al., 1998; Bland et al., 1986; Bruton et al., 2000; Watkins et al., 2009). Please provide this statistics, if the authors wish to compare-propose the methodology of the DLP as an additional CPET examination.

Results

General comment: it will be very helpful for the readers if authors provide only the results in this section, without any comment. A re-phrasing of whole section seems to be necessary. In addition, they are several duplicated-triplicated presentation of the results. Authors should consider to keep only the necessary. E.g. not both graphs and tables and e.t.c. Finally, all the previous mentioned statistics should be added here.

Page 6 line 17. The different reasons for the test termination between the two test should be discussed analytically in the discussion section.

Page 6 line 31. Why VO2VT2 could not be identified in 2 participants?

Discussion

General comment. In these section, authors are many times re-represent their results. This is something that it should be kept in minimum. It will be very interesting an in depth discussion of their results, as well as some comparisons with other studies in the field. In addition, they are large parts of the discussion without any reference. In addition, authors should consider a throughout revision of the manuscript for proper grammatical and syntax corrections. In many cases they are strong syntactical errors. Finally, Authors should consider to discuss the physiological bases for their results.

Page 6 lines 42-44. Why authors start they discussion by repeating the aim of the study. This is not necessary. A proposition is to start their discussion with the main findings of their study.

Page 6 lines 46-47. This is the main finding of the present study? Authors should consider their results for what are their significant main findings and rephrase the whole section. In addition, according to their results and statistics, it is not suitable to state that DLP can be used for CPET, but only for the measurements of cardiopulmonary responses during such an exercise.
Page 6 lines 53-60. How sure are the authors about the accurate estimation of all max and submaximal outcomes that are the true ones, when they didn't perform the necessary statistics for these comparisons.

Page 7 line 15. Please rephrase the whole paragraph. In many cases it is very difficult to follow it, e.g. "are due in turn to differences in the nature"? In addition, authors state about the work, but nowhere in the manuscript the total work performed in both test are presented. Only in Fig 4, a plot of work/time is presented, at which it could be identified that the work of DLP was higher than CE and participant reached the Peak work sooner than in CE. If the work per time and/or the total work between the two test is significant different, a significant methodological issue is raised. This difference could explain lots of the results of the present study. Authors should provide data and the results of the statistics analyses for the work that performed during the two tests, as well as a detailed discussion for who the works of each test, as well as the possible difference of works between the two test could affect their results.

Page 7 2nd paragraph. Please rephrase the whole paragraph. It doesn't make any sense and it very difficult to followed. In addition, please use proper references.

Page 7 3rd paragraph. Even if they are significant lower outcomes for the DLP, the RER at the end of the two test was almost the same, which is what is expected when a ramp test until exhaustion is performed. However, which are the physiological demands between the two tests, as well as the physiological bases of these results? Why DLP outcomes were lower and what are they means? A detail physiological discussion is necessary.

Page 7 lines 33-34. "Saengsuwan et al. [9, 17] compared a robotics-assisted tilt table with a cycle ergometer and a treadmill." This sentence is repeated.

Page 7 lines 47-48. "An alternative modality for safely investigating cardiopulmonary outcomes in impaired subjects is the arm ergometer." Reference?

Page 7 lines 51-52. "Thus, based on the results of the present study, the DLP might be able to provoke higher $\dot{V}O_2$peak than the arm ergometer.". Have authors tested it? The answer is no. So it is appropriate to use this sentence in their manuscript.

Page 7 lines 60-62. "For the DLP, the observed range was 6 min 30 s to 11 min 30 s: just one test (that with duration 6 min 30 s) lay outwith the 7-26 min CE range, but it was still within the 5-26 min treadmill range.". it is difficult to follow this sentence. Please rephrase.

Figure 4. Please delete the [/] from each axe

Figure 5-6. Iplease integrate the two protocols into each graph, This will leads to a better view of the differences between the two tests.
Figures 6-7. Are these Bland & Altman plots? If yes this should be mentioned in the statistics section.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

No

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

Yes

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No

**Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?**
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I am able to assess the statistics

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