Author’s response to reviews

Title: The effect of running task on muscle shear elastic modulus of posterior lower leg

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Author’s response to reviews:

Dr Alan Borthwick
Editor in Chief
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Dear Dr. Alan Borthwick

Ref. No.: JFAR-D-17-00083
We are most grateful to you and your journal’s reviewers for the helpful comments on the original version of our manuscript entitled, "The effect of running task on muscle shear elastic modulus of posterior lower leg", by Shuhei Ohya, Masatoshi Nakamura, Takafumi Aoki, Daichi Suzuki, Takanori Kikumoto, Emi Nakamura, Wataru Ito, Ryo Hirabayashi, Tomoya Takabayashi, Mutsuaki Edama.

We have revised the manuscript in accordance with the reviewers’ suggestions and hope that the article is now suitable for publication in the Journal of Foot and Ankle Research.

Our point-by-point responses are set out below. For clarity, reviewer comments are italicized and the changes in the revised manuscript are highlighted in red.

Thank you for your time and we look forward to hearing from you at your earliest convenience.

Yours sincerely,

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Reviewer reports:

Reviewer #1: Thank you for your revised manuscript. Almost of all the questions were appropriately answered. The quality of this manuscript has become good level for publication.

A few comments or suggestions are followings,

Thank you for your constructive comments and useful suggestions. We have enclosed point-by-point responses to your comments here. For clarity, we have used red font for our responses and used underlined, red font for the revised passages.

#1
I agree that the purpose of this study was to investigate the effect of running on the shear elastic modulus of the posterior lower leg. And the results showed that the shear elastic moduli of FDL and TP muscles increased after a running task. But, I still wonder even if the results indicated the significant elevation of the elastic moduli after tasks, the difference of the pre and post values were slight and SD were large. Was it proper to connect the elevation of elastic moduli on this study to the occurrence of MTTS? Were the absolute values of the elastic moduli high enough to the substantial for inducing MTTS? How do the authors think prolonged and repetitive running protocols would reach to the threshold of abnormal elastic moduli?

Although the author added the some sentences in the limitation of discussion, it did not come to the point of mine.

Thank you for your comments. As you have pointed out, our results showed that there were only slight differences between the pre and post values, and the SD was large. In addition, the threshold of abnormal shear elastic modulus and the relationship between the increase in shear elastic modulus and injury occurrence were not clarified. Therefore, based on the present study results, we cannot definitely conclude whether the increase in the shear elastic modulus after the running task was directly associated with the occurrence of MTSS. However, previous studies (Akiyama et al. 2016; Saeki et al. 2017) have reported that the shear elastic modulus in MTSS patients and subjects with MTSS history was higher than that in healthy subjects or subjects without MTSS history. Thus, we assumed that the increase in shear elastic modulus might be associated with the occurrence of MTSS. To elucidate this view, a prospective study that investigates the relationship between the increase in shear elastic modulus after the running task and MTSS occurrence is warranted. Therefore, we have added the following portion, describing the need for a prospective study in the Discussion section:

(Page 12, lines 226–228)

In the future, a prospective study investigating the relationship between the increases in shear elastic moduli of FDL and TP after the running task and MTSS development should be conducted.

#2 Author answered,

> In addition, as per your suggestion, the absolute values for shear elastic modulus in this study were 2-6 times lower than those in the previous study (Saeki et al, 2017), because the ankle joint positions differed between the two studies; the shear elastic modulus was measured at 0° dorsiflexion of the ankle joint in this study and at 20° dorsiflexion of the ankle joint in the previous study.
I agree with above explanation, but the recent papers on Journal of Foot and Ankle Research "The reliability of shear elastic modulus measurement of the ankle plantar flexion muscles is higher at dorsiflexed position of the ankle, Junya Saeki, Tome Ikezoe, Masatoshi Nakamura, Satoru Nishishita and Noriaki Ichihashi, 2017,10:18" showed that. So, it may be better to refer this paper. But, why the author chose the angle of the ankle at 0 deg?

As per your comment, we have quoted this previous study (Saeki et al. 2017. JFAR) and added the relevant description (provided below). In addition, the previous study reported that the reliability of the shear elastic modulus measurements at 20 degree dorsiflexion was higher than that at 10 degree or 0 degree. However, the upper limit of the shear elastic modulus measurement in the machine used in this study (Aplio 500, Toshiba Medical Systems, Tochigi, Japan) was 66.7 kPa, and it was impossible to measure the shear elastic modulus at 10 and 20 degree dorsiflexion. Therefore, we chose the angle of 0 degree for the ankle in this study.

(Page 9, lines 180–182)

In this study, the measurement of the shear elastic modulus showed moderate to excellent reliability, consistent with the results of a previous study [21].

#3

Topic sentence at the beginning of the third paragraph was about the methodology. But the contents of this paragraph were the remarkable results of the previous studies on shear elastic modulus. It is still difficult to understand smoothly. Too long paragraph? Too details? Is it possible to divide the paragraph into two?

Thank you for your observation. As per your suggestion, we have divided this paragraph into three sections: First paragraph was methodology section in line 72–76. Second paragraph was explanation of the previous studies on shear elastic modulus in line 77-91. Third paragraph explained the problems of the previous studies and the purpose of this study in line 92-101.

#4 I am not happy with the revision. The pain itself does not influence to the elastic modulus.

As you have correctly pointed out, the pain itself does not influence the shear elastic modulus. Muscle contraction is caused by the pain-induced spasms, and the shear elastic modulus is increased due to muscle contraction. Therefore, we have revised the description, as follows, to clarify this point.
However, because the increase in muscle stiffness can be caused by muscle contraction due to the pain-induced spasms [15], the pain at the time of measurement may influence the shear elastic modulus.

#6-2 Why the author did not collect the data of SOL and FHL, which were measured in Ref. #15?

> SOL and FHL could not be measured due to machine performance and technical problems.

Author answered. But, please indicate the detail of the problems. What specification of the machine performance deterred the measurements?

And, if possible, please write clearly inside the manuscript the reason why the author did not measure SOL and FHL. Otherwise, the future readers will be questioning it.

Thank you for your suggestions. We are unaware of the machine performance specifications that deterred the measurements. However, as this was a pilot experiment, there were subjects for whom the shear elastic modulus of Sol could not be measured in this study. In addition, the reliability of the shear elastic moduli of Sol and FHL could not be guaranteed. Therefore, the shear elastic moduli of Sol and FHL were not measured in this study unlike in the previous study. We have added the following description to clarify the reason for not measuring Sol and FHL in this study:

Second, as this was a pilot experiment, it included some subjects for whom the shear elastic modulus of Sol could not be measured. In addition, because the reliability of the shear elastic moduli of Sol and FHL could not be guaranteed, we did not measure these.

Otherwise good.

We thank the Reviewer for the constructive comments and useful suggestions, using which we have been able to improve our manuscript.