

Reviewer number 03998375 specific comments to the authors

*Title: the last part of the title (An observational before and after study) is unsuitable that should be omitted or changed such as (An observational study). More physiological factors other than cytokines should be elicited as a cause for decrease pain pressure thresholds after lumbar flexion position. The study limitations should be outlined in the Discussion.*

Author's response to comments from reviewer number 03998375

Thank you for the positive comments.

- We have now amended the last part of the title to “An observational study”.
- We have now deleted the text “due to cytokines” and added the yellow highlighted text to the following sentence “Biochemical processes may even be influenced by prolonged tissue loading providing a pathway for tissue sensitivity and inflammation[15]”. These changes to provide a more pragmatic statement regarding potential biochemical process in addition to the biomechanical and psychosocial factors introduced in the previous paragraph.
- To specify the study limitations in the discussion more clearly, we have now added the following text highlights -
  - o In paragraph 2: One may consider a potential limitation of repeated pain pressure threshold testing being that it may cause tissue sensitization, which may in turn decrease pain pressure thresholds. However, previous studies using up to 3 measurements at the same point to determine pain pressure threshold on lumbar spine structures as well as similar spatial distances between adjacent points and the time between repeated measurement (at least 10 minutes) have been shown to prevented spatial and temporal summation<sup>[20,40]</sup>.
  - o In paragraph 3: “However, a potential limitation in our study is that 38 percent of the participants did reach 15 minutes in a fully flexed lumbar sitting posture without experiencing low back pain intensity of 7/10”.

- In paragraph 4: “A limitation with our study was however that sample size was not specifically powered to minimize potential false negative results for gender subgrouping, but a trend was seen that healthy young adult men have higher lumbar thresholds than women.

Reviewer number 00505357 specific comments to the authors

*This an interesting study with a pre-post-test design and maximum flexion seating in between.*

*Assessment included measurement of pain thresholds before and after flexed seating. 26*

*participants showed lowerd pain thresholds. Some points should be addressed before publication : 1*

*There is no control group and therefore pain sensitisation by the pain threshold measurement using an algometer can not be ruled out. Author(s) should test potential pain sensitisation by algometer*

*use and repeated algometer use after 15 min in a small sample. 2 Please report Spearman rank*

*correlation between time of seating with max flexion (varies between 12 and 15 min) and pain*

*threshold before seating, after seating, and change in pain thresholds. 3 Outlook: Authors should*

*add the need for an experimental trial and variation of flexion in various degrees. 4 Authors should*

*also discuss whether flexion ist he specific agent responsible for the lower pain threshold or the*

*unchanged sitting position across 15 min per se. Please refer to: Bontrup, C., Taylor, W. R.,*

*Fliesser, M., Visscher, R., Green, T., Wippert, P.-M., & Zemp, R. (2019). Low back pain and its*

*relationship with sitting behaviour among sedentary office workers. Applied Ergonomics, 81,*

*102894. doi:https://doi.org/10.1016/j.apergo.2019.102894 5 Power calculation is reported twice (at*

*para «participants» and para « data analysis ») 6 delete one « and » at author contributions*

Author's response to comments from reviewer number 02444729

Thank you for the positive comments. We have now addressed in the manuscript the following points you requested:

- 1) We have now referred to previous literature negating potential pain sensitization by algometer use and repeated algometer use after 15 min

Discussion - In paragraph 3: One may consider a potential limitation of repeated pain pressure threshold testing being that it may cause tissue sensitization, which may in turn decrease pain pressure thresholds. However, previous studies using up to 3 measurements at the same point to determine pain pressure threshold on lumbar spine structures as well as similar spatial distances between adjacent points

and the time between repeated measurement (at least 10 minutes) have been shown to prevent spatial and temporal summation<sup>[20,41]</sup>.

2) We have trialed and discussed with our statistician if our data supports the testing of spearman rank correlation between time of seating with max flexion (varies between 12 and 15 min) and pain threshold before seating, after seating, and change in pain thresholds. Considering analyses show low- moderate correlation ( $\rho < 0.3$ ), a sample of  $>80$  participants would be needed to provide correlation results with statistical power of at least 80%, but our sample is substantially under powered for this analysis. Even if a large effect size ( $\rho=0.5$ ) was shown, considering a statistical power of at least 80%, a sample of 26 would be needed. But in that case we would even need to consider that we have a ceiling effect for 38% of our sample regarding time of seating with max flexion, and the variation in our data is only based on 16 participants, which would still be substantially under powered if large correlation were seen. Our conclusion is that the use of correlation statistics on our data would result in erroneous results.

3&4) In line with your recommendations, we have now added the following sentences in paragraph 2 of the discussion that also refer to the reference you suggested:

“Previous research suggests a relationship between longer time periods of static sitting and pain in the lumbar spine<sup>[2,40]</sup>. Bakker *et al*<sup>[3]</sup>, suggests that intensive use of the lumbar spine in flexion has a strong connection to the development of lumbar pain. Therefore, in relation to the results of our current study, it is possible that both longer periods of static sitting as well as flexed lumbar posture are possible mechanisms of sensitization of lumbar spine structures. To compare importance of these potential mechanisms, future experimental trials should investigate variation of flexion in various degrees during long periods static sitting.”

5) We have now deleted from the data analysis section the power calculation which was already reported in the participants section.

6) We have now edited the author contribution section as recommended.