

Thank you for contributions to mechanically assisted spinal stiffness research. This device shows promise and may be feasible to use in a clinical setting to assess spinal stiffness for novice assessors. The authors found that spinal stiffness assessment via using a portable algometer and the Kinovea program are comparable. These options appear to be feasible methods to assess stiffness in clinical settings. The authors have contextualised their findings relative to existing literature.

Abstract:

Line 42-43 states "The measurement of spinal stiffness can be utilized to guide therapeutic decisions regarding physical therapy that result in effective back pain management."

Consider rewording to softer language, or insert an appropriate citation that supports this statement.

Line 52-53 states "Spinal displacement values at 15 N were defined by graph plotting between force and displacement." Should this read spinal stiffness, rather than spinal displacement?

Line 61-62 states "The inter-rater analysis's Bland-Altman plot showed that the systematic bias was 0.83 when measuring displacement and 0.20 when measuring stiffness." Please specify which direction the systematic bias is in.

Line 63-64 states "While the test-retest systematically biased measurements of displacement and stiffness were -0.26 mm and 0.22 N/mm, respectively." Again which direction?

Introduction:

Line 75-76 states "The most common muscle in today's society is thought to affect 60–80% of the world's population (Vos et al., 2015)". Should this read musculoskeletal condition/problem?

Line 76-77 states "Back pain affects the quality of life of an individual and can lead to disability or even serious death (Shipp et al., 2009; Tella et al., 2013)." For back pain that stems from a serious pathology. However, if there is a serious pathology stiffness assessment isn't really appropriate.

Line 77-78 states "Therefore, an accurate diagnosis on the cause of back pain can lead to early and proper treatment." I wouldn't say PA stiffness assessment helps give us an accurate diagnosis or can identify the cause of back pain. I would be more inclined to argue that for mechanical back pain, better assessment tools can assist manual therapists by guiding intervention targets.

Line 78-80 states "The spinal stiffness assessment can be used in clinical decisions related physical therapy that leads to effective treatment." If you are going to say a definitive statement like leads to effective treatment please provide a citation or omit and say guides interventions to soften language.

Line 81-82 states “Physical therapists can use manual passive intervertebral movement (PIVM) in the back-to-front direction to measure how stiff the spine is in people with low back pain.” Posterior-anterior, it probably goes without saying that your readers will be familiar with anatomical terminology. Introduce (PA) abbreviation here and continue to use throughout.

Line 102 insert citation here – assuming Tuttle & Hazle 2018.

Line 109-112 states “However, it was complicated, required many steps, and was not appropriate with the clinical application. We are concerned that clinical measurement should be simplified, made reproducible, and generalized to all, whether they have high clinical experience or not.” It sounds like there are 2 issues. That for novice users that 1) measurement appears to be an issue, and number 2) interpretation is an issue? Your study doesn’t really address interpretation though?

Line 114-117 states “To the best of our knowledge, a new simple data analysis technique was first introduced to identify the parameters corresponding to spinal stiffness: displacement at 15 N of force application and average stiffness determined by computing the slope change at every 2 mm of displacement.” Insert citation?

Line 129 states “recruited by a convenience sampling method”. Do you mean convenience sampling?

Line 160-161 states “The raters were female, 22 years old, weighed 52 (5.66) kg, and heighted 151 (2.83) cm.” This wording is awkward and cumbersome.

Line 175-176 states “The next day, the participants were asked to determine in the same protocol as the first day.” Is this supposed to read the participants were examined using the same protocol as the first day?

Line 180-182 states “The study was designed to randomize the sequence of the lumbar segment to determine the lumbar displacement.” Why was this randomised? Does this emulate what you would do in research or clinic?

Line 187-190 states “The rater stood beside the treatment bed assuring that their shoulders were vertically aligned with the algometer's handle, and then pushed down while the participant exhaled with increasing force until they reached the end-feel.” Maybe define elastic barrier?

Line 194-195 states “Video clips where the force display screen does not start at 0 N and the algometer shaft area is obscured were excluded.” Why were these excluded? Was protocol not to check data collection as it went. Maybe define this in the methods?

Lines 203-202 states “The tracking path was ended at the end-feel of movement, which was decided by declining the force application” this was confusing, and I am wondering if you could rewrite for clarity?

Results:

Table 1, should include a footnote with the abbreviations. You also need to specify that you are reporting mean (sd).

Lines 240-242 states "No participant was excluded; however, 11 videos were excluded from the total of 600. 7 videos did not start at force application at 0 N, and 2 videos could not be performed line calibration due to obstructions at the algometer's shaft." Were these data not checked after they were collected? Was this not part of the protocol?

Discussion:

Line 299-300 states "In the previous study, the stiffness of the spine was determined by figuring out the least-square cubic spline fit (Björnsdóttir et al., 2016)." Reword for clarity.

Line 307 states "(Maitland, 2005). In" Add a space.

I'm not certain about the protocol, I am not sure did you use breathing to consistently measure? E.g. stiffness can be influence by intrabdominal pressure. If you controlled for this please state.