INTRODUCTION

- In 2016, the highest prevalence of spondyloarthritis was in North America and Europe, 1.35% and 0.54% respectively (Stolwijk et al., 2016)
- A key outcome measure for axial spondyloarthritis (axSpA) is spinal mobility, but this is highly variable and subjective when assessed using conventional tools, e.g. goniometer (Mancini and Horak, 2010)
- Cervical rotation is the only movement test measured in degrees in the BASMI
- Inertial Measurement Unit (IMU) sensors can attain accurate measures of body motion.

AIM:
Evaluating the reliability of IMU attained measurements (from movement tests performed by axSpA participants) against measurements attained from conventional BASMI, the ‘Truth’ dimension of the OMERACT filter (Wells, Beaton, Tugwell, et al., 2014)

MATERIALS AND METHODS

- Key points of our methodology are summarised in Diagram 1
- Intra-rater, inter-rater and test-retest - with a two week gap between tests - reliability tests were performed in a sequence (Figure 2).

RESULTS

- Pearson correlations for IMU and conventional measurements are shown in Tables 1 and 2
- Lumbo-pelvic restriction unforeseen patterns were found: The mean contribution to the lumbar flexion by the pelvic movement was 52.6%
- 15 out of 40 participants had an abnormal Lumbo-Pelvic Rhythm (LPR): There were identified 7 individuals and 8 individuals with lumbar and pelvic restrictions respectively
  - Of these individuals: 12 had trunk flexion <70 degrees.
  - In those with trunk flexion >70 degrees, 22 out of 25 had a normal LPR

DISCUSSION AND CONCLUSION

- Test-retest reliability of individual cervical movement tests was good to excellent (ICC >0.8), superior to those reported by Theobald, Jones and Williams (2012)
  - Lumbar movement tests had slightly lower test-reliability (ICCs >0.7), similar to the findings reported by Rance et al. (2008) and Lane, Kent and Keating (2012), using the same sensor setup
  - Combining the right axial or flexion/extension movements improved reliability, probably because it is difficult for assessors to appraise the return to the exact midline point

- Both intra-rater and inter-rater reliability were excellent
- Cervical movement tests were more reliable than lumbar spine movement tests
- The variability in lumbar measurements was due to biological variability rather than sensor error. Lane, Kent and Keating (2012) suggested that it was due to inherent variability in the “lumbo-pelvis rhythm”
- IMU sensors tests are of clinical relevance, because they give a detailed overview of movement limitations in degrees by region and movement type

- IMU measures showed reliable equivalence with the comparable BASMI measurements, correlating closely
  - Lumbo-Pelvic Restriction patterns that were unexpected were found
  - IMU sensors were highly reliable in measuring spinal movements for axSpA patients

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