

showed good coverage across the range of the four concepts. DIF analyses are in progress.

**Conclusions:** The item banks exhibited good psychometric properties in the general Dutch population. The four Dutch-Flemish PROMIS item banks can be used to develop CATs for measuring physical function, fatigue, pain behavior and pain interference in the Netherlands. Dutch norm scores are presented.

**Disclosure of Interest:** None declared

**DOI:** 10.1136/annrheumdis-2017-eular.1247

#### THU0713 HOW THE VARIATION IN THE LUMBOPELVIC PATTERNS OF MOVEMENT AFFECTS THE NEUROMOTOR CONTROL OF THE BICEPS FEMORIS DURING TRUNK FORWARD BENDING

M. Sarti<sup>1</sup>, R. Expositor-Rodríguez<sup>2</sup>, R. Borona-Carvajal<sup>1</sup>, M. Ybañez-García<sup>3</sup>, M. Fuster-Ortí<sup>4</sup>. <sup>1</sup>Human Anatomy and Embryology, Universidad de Valencia (UVEG); <sup>2</sup>Inst. for Research on Musculoskeletal Disorders, Catholic University of Valencia; <sup>3</sup>Rheumatology Section, Pesset Hospital; <sup>4</sup>Department of Statistics and Operations Research, Universidad de Valencia (UVEG), Valencia, Spain

**Background:** Trunk forward bending is one of the most common activities in daily living; it is a two-part movement involving the lumbar spine flexion and pelvis rotation at hip joint. The pattern of movement during forward bending was defined as the relative contribution of the lumbar spine to pelvis motion, and was expressed as the ratio between the ranges of lumbar spine motion to pelvis motion (L/P), which, calculated at certain degrees of trunk flexion during the entire movement, provides the lumbo-pelvic rhythm. This is associated with a specific pattern of activation for back and hip extensor muscles which was coined as flexion relaxation phenomenon, observed either in the erector spinae and biceps femoris (BF). It has been shown that in healthy people lumbopelvic pattern of movement for entire flexion varies, showing both lumbar spine dominant and pelvis dominant-patterns of movement.

**Objectives:** To find out whether the variation in the lumbopelvic pattern of movement (lumbar spine or pelvis dominant) affects the appearance of the relaxation of the BF during trunk forward bending.

**Methods:** Surface electrodes were applied to the skin on right BF, midway between ischial tuberosity and head of fibula to record EMG during a trunk flexion movement from the upright position. The EMG signal was full-wave rectified and averaged (40ms) to produce a linear envelope. An electrogoniometer measured the differential lumbar spine - pelvis sagittal angular displacement during trunk flexion in asymptomatic subjects. Both signals (EMG and degrees) were synchronously and continuously captured during the movement. Ranges of flexion (ROF) for the lumbar spine, pelvis and trunk motion were calculated for the entire movement. The subjects (both sexes) were assigned to group-L (n=11) and group-P (n=15) according to exhibiting lumbar spine and pelvis dominant patterns of movement (average age, 24.5±3.3 years). The myoelectric relaxation (MR) appearance was defined in terms of degrees of flexion where the electrical activity of the BF was less than that in upright posture (EMG basal), at this point the degrees of flexion for the pelvis and spine were determined; and their respective "range of motion" (ROM) was calculated and normalized to range of trunk flexion. One-way MANOVA was used to determine differences in range of flexion at the appearance of the myoelectric relaxation between groups.

**Results:** ROF for MR of the BF was significantly greater in group-P (77.3%±3.4%) (p<0.01) than in group-L (47.8%±2.4%) for the pelvis, whereas ROF for the lumbar spine was significantly greater in group-L 95%±1.2% (p<0.01) than in group-P 40.41%±1.7%.

**Conclusions:** In healthy subjects, differences in lumbopelvic patterns of movement during trunk flexion vary the appearance of the relaxation of the biceps femoris in the range of flexion. Present results show that the variance of the lumbar spine and pelvis kinematics is associated with the neuromotor control of the biceps femoris.

**Acknowledgements:** Grants supporting present study: Ref. FIS2001-0070-01, Ref. TIC2001-2786-C02-02, Ref. AP2001-376

**Disclosure of Interest:** None declared

**DOI:** 10.1136/annrheumdis-2017-eular.6855

#### THU0714 INVESTIGATING THE EFFECTS OF HYPERMOBILITY ON BALANCE VARIABLES

M. Selmani<sup>1</sup>, A. Elvan<sup>1</sup>, B. Akcay<sup>1</sup>, G. Kenar<sup>2</sup>, A.M. Biriik<sup>2</sup>, S. Angin<sup>1</sup>, I.E. Simsek<sup>1</sup>. <sup>1</sup>School of Physical Therapy and Rehabilitation, Dokuz Eylul University Institute of Health Sciences; <sup>2</sup>Department of Internal Medicine, Dokuz Eylul University Faculty of Medicine, Izmir, Turkey

**Background:** Hypermobility syndrome (HMS) is a clinical syndrome in which the range of motion of the joint is observed above normal ranges without being associated with a rheumatic disease. Excessive joint motion in HMS reduces joint stability and joint position sense and also can cause pain. Decreased muscle tone and tensile forces of the tendons cause decreased locomotor system stiffness and impairment of proprioception mechanisms. These problems in proprioceptive mechanisms can lead to balance-related disorders in individuals with hypermobility syndrome

**Objectives:** The aim of this study was to investigate the possible effects of hypermobility on balance variables.

**Methods:** 50 hypermobile (5 males and 45 females) volunteers diagnosed with Brighton Scale and 50 healthy (21 males and 29 females) volunteers were included in this cross sectional study. Participants with a score of 4 or over according to the Beighton scale were referred to a rheumatologist and were administered Brighton scale. Participants who were diagnosed by the physician were included in the hypermobile group. The objective balance evaluation was conducted using a balance platform. Evaluation variables were; static balance on single foot, static balance on both feet, limits of stability test and tandem walking. analysis was performed using independent samples t-test.

**Results:** The mean age was found 21,69±2,13 years old for the control group and 20,09±2,65 years old for the HMS group. Body Mass Index was found 22,13±3,54 kg/m<sup>2</sup> in the control group and 21,54±3,50 kg/m<sup>2</sup> in the HMS group. HMS group showed significant wider step width in tandem walking (p=0,001), significantly longer reaction time (p=0,23, p=0,030), significantly higher end-point excursion (p=0,003, p=0,026, p=0,049), significant higher mean maximum excursions (p=0,018) (Table 1).

Table 1. Comparison of Groups About Balance Variables

	HMS Group (Mean ± SD)	Control Group (Mean ± SD)	p
Tandem Walking			
Step-Width (cm)	6,52±0,89	7,20±1,10	0.001*
Limits Of Stability			
Reaction Time 2 (sec)	0,91±0,44	0,72±0,37	0.023*
Reaction Time 6 (sec)	0,78±0,36	0,64±0,25	0.030*
End-Point Excursion 1 (%sec)	86,69±17,73	73,19±26,17	0.003*
End-Point Excursion 4 (%sec)	76,56±17,36	83,92±14,91	0.026*
Maximum Excursion 5 (%sec)	76,54±18,31	82,69±11,50	0.049*
Mean Maximum Excursion (%sec)	94,56±6,51	97,25±4,29	0.018*

\*p<0.05.

**Conclusions:** In this study it was found that hypermobility has significant effects on the stability limits test and tandem walking. In previous studies it was found that hypermobility affects the static balance assessment variables (1, 2), but in this study dynamic balance assessment variables were affected.

**References:**

- [1] Iatridou K, Mandalidis D, Chronopoulos E, Vagenas G, Athanasopoulos S. Static and dynamic body balance following provocation of the visual and vestibular systems in females with and without joint hypermobility syndrome. *J Bodyw Mov Ther.* 2014 Apr;18(2):159-64. doi: 10.1016/j.jbmt.2013.10.003.
- [2] Juul-Kristensen B, Johansen K, Hendriksen P, Melcher P, Sandfeld J, Jensen BR. Girls with generalized joint hypermobility display changed muscle activity and postural sway during static balance tasks. *Scand J Rheumatol.* 2015 Sep 1:1-9.

**Disclosure of Interest:** None declared

**DOI:** 10.1136/annrheumdis-2017-eular.6256

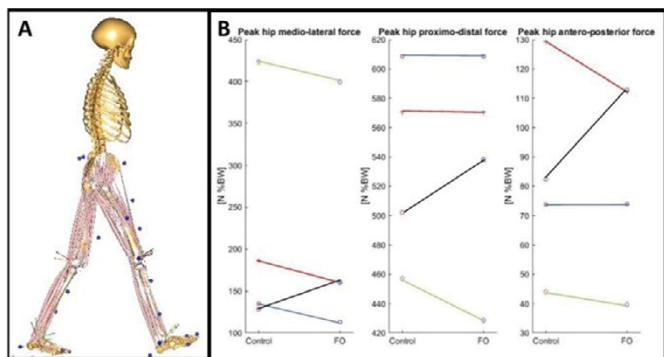
#### THU0715 ESTIMATION OF THE EFFECT OF FOOT ORTHOTICS ON HIP JOINT LOADING FOR RHEUMATOID ARTHRITIS PATIENTS USING MRI-BASED MUSCULOSKELETAL MODELS: A PILOT STUDY

M.B. Simonsen<sup>1</sup>, K. Næsborg-Andersen<sup>2</sup>, M.R. Kowalski<sup>3</sup>, K. Hørslev-Petersen<sup>4</sup>, M.S. Andersen<sup>1</sup>. <sup>1</sup>Department of Mechanical and Manufacturing Engineering, Aalborg University, Aalborg; <sup>2</sup>Bandagist-Centret A/S, Haderslev; <sup>3</sup>Department of Rheumatology, Hjørring Hospital, Hjørring; <sup>4</sup>King Christian 10th Hospital for Rheumatic Diseases, Gråsten, Denmark

**Background:** Over 85% of rheumatoid arthritis (RA) patients experience feet and ankle problems during the course of the disease. Persistent foot and ankle problems still occur even after clinical remission is reached [1]. In RA, synovitis, effusion, and eventually erosive arthritis are thought to cause clinically recognizable planovalgus or valgus heel [1]. With the intention to stabilize and align the foot, patient-specific foot orthotics (FO) are commonly prescribed to this patient group. A limitation of the previous literature on FO to treat RA and related diseases is that it has focused exclusively on clinical outcomes of FO such as pain and physical function, while overlooking the biomechanical principles on which the rationales for FO is based [2].

**Objectives:** The aim of this study was to investigate the effect of patient-specific FO on hip loading during gait. This was accomplished by developing patient-specific (PS) musculoskeletal models (MS) capable of estimating joint mechanics with and without the FO.

**Methods:** Four early stage RA patients were recruited for this study. A pair of FO was developed for each patient using a weight bearing casting technique. PS bone geometry was obtained from magnetic resonance imaging (MRI) images and segmented in an image analysis package (Mimics 19, Materialise, Belgium). Motion capture was performed with an eight-camera setup (Qualysis, Sweden) with reflective markers together with three force plates (AMTI, USA) sampling at 100 and 1000 Hz, respectively. The gait trials consisted of two conditions: one with the PS FO and one with a control insole (C). PS MS models of each patient were developed using the AnyBody Modeling System (AnyBody Technology, Denmark), Figure 1A. Muscle attachments were made PS based on the Twente Lower Extremity Model version 2.0 dataset using advanced morphing to customize a generic cadaver-based model with respect to PS morphology



acquired from MRI [3]. Accurate joint centers and axes were calculated with analytical surface fits to the segmented MRI bones for the hip, knee and ankle.

**Results:** Peak hip force for medio-lateral (ML) proximo-distal (PD) and antero-posterior (AP) is presented in Figure 1B for the C and FO with values for each subject.

**Conclusions:** The results of this study indicate that FO can change the load distribution in the hip joint. A reduction or similar values for ML, DP and AP force was found for all but one participant. These changes may potentially contribute to the reduction in pain. Further studies are needed to investigate if there is a relationship between changed loading and pain for RA patients. This knowledge can potential be used for design of better FO and clinical guidelines for use of FO.

#### References:

- [1] Hennessy K. et al, *Arthritis Care Res*, 64: 311–320, 2012.
- [2] Lewinson R. et al., *Ann Biomed Eng*, 44: 3173–3185, 2016.
- [3] Marra M, et al., *J Biomech Eng*. 137: BIO-14–1490, 2015.

**Acknowledgements:** The study is financially supported by The Danish Rheumatism Association [R142-A4113].

**Disclosure of Interest:** None declared

**DOI:** 10.1136/annrheumdis-2017-eular.2169

#### THU0716 LONGITUDINAL OUTCOME OF AEROBIC FITNESS IN ADOLESCENTS AND YOUNG ADULTS WITH JIA

P.V. Pelt<sup>1,2</sup>, T. Takken<sup>3</sup>, M.V. Brussel<sup>4</sup>, R. Dolhain<sup>1</sup>, J. Hazes<sup>1</sup>, J. Bijlsma<sup>5</sup>, N. Wulffraat<sup>6</sup>, A. Kruize<sup>5</sup>. <sup>1</sup>Department of Rheumatology, Erasmus MC, University Medical Center Rotterdam, Rotterdam; <sup>2</sup>Department of Pediatric Immunology, Wilhelmina Children's Hospital, University Medical Center Utrecht; <sup>3</sup>Child Development and Exercise Center, Wilhelmina Children's Hospital, University Medical Center Utrecht; <sup>4</sup>Child Development and Exercise Center, Wilhelmina Children's Hospital, University Medical Center Utrecht; <sup>5</sup>Department of Rheumatology and Immunology, University Medical Center Utrecht; <sup>6</sup>Department of Pediatric Immunology, Wilhelmina Children's Hospital, University Medical Center Utrecht, Utrecht, Netherlands

**Background:** Aerobic fitness may serve as an important health-related outcome measure in JIA. A reduced aerobic fitness is associated with cardiovascular morbidity, mortality and osteoporosis in adult patients with chronic diseases. However, in adolescents and young adults, long-term outcome data of aerobic fitness are unknown. Reduced aerobic fitness was described in cross-sectional studies in children and adolescents with JIA, and was more impaired in active disease

**Objectives:** Our objectives are to describe course of the aerobic fitness in a longitudinal cohort of adolescents and young adult JIA-patients who are intensively treated including the possibility of biologics and to identify the association of clinical variables with aerobic fitness.

**Methods:** In a longitudinal cohort, all consecutive JIA patients aged 10–24 years were included after informed consent. Annual examinations were obtained from demographic and disease-related items. At baseline and end of the study, aerobic fitness (VO<sub>2</sub>peak) was assessed using a graded cardiopulmonary exercise test (CPET) to volitional exhaustion performed on an electronically braked cycle ergometer. Absolute and relative VO<sub>2</sub>-peak values were measured and related to healthy controls (Z-scores), using one-sample T-tests. Non-parametric tests were used to evaluate results

**Results:** Paired Z-scores were available from 27 patients. 44% were male, median age at baseline was 13,0yrs (IQR 4,3), disease duration 7,6yrs (6,7), JADAS27 4,0 (5,9), DAS28 2,2 (1,2). 76% of the patients were in DAS28-remission. 11% had systemic JIA, 7% persistent oligoarticular and 82% had a polyarticular course. Baseline and end Z-scores were reduced compared to healthy controls (ZAbs\_base -0,68, IQR2,3 p=0,01; Zrel\_base -1,33, IQR 2,0, p<0,01; Zabs\_end -0,23, IQR 1,7, p=0,06; Zrel\_end -0,87, IQR 2,2, p=0,01) and did not change significantly over time (change Zabs\_change 0,45, p=0,34; Zrel\_change 0,46, p=0,31). At baseline, MTX-use (p=0,04) and a higher DAS28 (p=0,015) and ESR (p=0,013) are associated with a worse outcome of aerobic fitness. The greatest improvement of aerobic fitness over time was seen in patients with a higher ESR (p<0,01) and thrombocytes (p<0,01) at baseline. Multivariate analysis showed that a higher DAS28 and male gender were the most important variables for worse

aerobic fitness at baseline, a higher ESR at baseline was the most important predictor for improving aerobic fitness over time

**Conclusions:** Aerobic fitness is significantly reduced in adolescents and young adults with JIA and does not improve over time, despite intensive treatment. Be aware of a reduced quality of life due to a persistent reduced aerobic fitness during disease course of JIA, despite low disease activity

#### References:

- [1] Aerobic capacity and disease activity in children, adolescents and young adults with juvenile idiopathic arthritis (JIA). Ph.A. van Pelt MD, T. Takken PhD, M.van Brussel PhD, M. de Witte. A.A. Kruize\*, MD, N.M.Wulffraat\* MD, PhD. *Pediatr Rheumatol Online J*. 2012 Aug 27;10(1):27. doi: 10.1186/1546-0096-10-27.

**Disclosure of Interest:** None declared

**DOI:** 10.1136/annrheumdis-2017-eular.4756

#### THU0717 MIRROR VISUAL FEEDBACK THERAPY IMPROVES CLINICAL OUTCOMES AND THE ACTIVITY OF DAILY LIVING TO PATIENTS WITH HAND COMPLEX REGIONAL PAIN SYNDROME

S. Patru<sup>1</sup>, I.R. Marcu<sup>2</sup>, D. Matei<sup>1</sup>, A.M. Bumbea<sup>1</sup>, A.C. Bighea<sup>1</sup>. <sup>1</sup>Physical Medicine and Rehabilitation; <sup>2</sup>University of Medicine and Pharmacy of Craiova, Craiova, Romania

**Background:** Wrist osteoporotic fractures may be as disabling as vertebral or hip fractures and the functional decline attributed to them is similar to that seen for arthritis and diabetes mellitus. Sometimes these fractures will lead to a painful, debilitating condition with sensory and motor disturbances, changes in vascular tone, temperature and edema- complex regional pain syndrome (CRPS). We found some clinical trials and case reports which conclude that mirror visual feedback therapy (MVFT) improves clinical outcomes and the activity of daily living to patients with hand neurological disorders, including CRPS.

**Objectives:** In this controlled randomized clinical study we tried to investigate the effects of (MVFT) in CRPS type I following osteoporosis wrist fracture.

**Methods:** We included 21 subjects with osteoporotic wrist fracture and early CRPS (duration of 3–4 weeks), with a single hand affected by allodynia, stiffness and vasomotor disturbances, from Physical Medicine and Rehabilitation outpatient clinic. They are randomly assigned into two groups: MVFT group (n=11, simply place a mirror between their two hands and train the patient by asking them to move both hands while watching the reflection of the non-affected hand in the mirror, 10 minutes for each session, four times a day) and Control group (n=10, moved both hands separated by an opaque partition between the arms). All subjects also received conventional therapy. On presentation and after 4 weeks of rehabilitation programme we assessed the wrist flexion and extension with a goniometer and the Patient-Rated Wrist Evaluation (PRWE) a 15-items questionnaire designed to measure wrist pain and disability in activities of daily living.

**Results:** Subjects in the mirror therapy group showed significant improvement in range of motion: extension increased with 50.4% vs. 41.7% and for flexion MVFT achieved 33.2% and Control group 16.8% (P<.001). The rehabilitation programme also increased hand function with better results to 4 weeks PRWE for MVFT group (40.4 vs. 51.8, P=0.003).

**Conclusions:** MVF is a simple, inexpensive, without adverse events treatment option that significantly reduces pain and stiffness and improves hand mobility in early CRPS after osteoporosis wrist fracture.

#### References:

- [1] Vladimir Tichelaar YI, et al. Mirror box therapy added to cognitive behavioural therapy in three chronic complex regional pain syndrome type I patients: a pilot study. *Int J Rehabil Res* 2007; 30: 181–8.
- [2] Bache SJ, Ankorn L, Hiller L, Gaffrey A. Two different approaches to physiotherapy management of patients with distal radius fractures. *Physiotherapy*. 2000;86:383.

**Disclosure of Interest:** None declared

**DOI:** 10.1136/annrheumdis-2017-eular.2339

#### THU0718 DIFFERENCES IN THE COURSE OF ITALIAN- AND GERMAN-SPEAKING PATIENTS' OUTCOME AFTER INTERDISCIPLINARY PAIN PROGRAM

T. Benz<sup>1,2</sup>, S. Lehmann<sup>2</sup>, R. Brioschi<sup>2</sup>, A. Elfering<sup>1</sup>, A. Aeschlimann<sup>2</sup>, F. Angst<sup>2</sup>. <sup>1</sup>Institute of Psychology, University of Bern, Bern; <sup>2</sup>Research Department, RehaClinic, Bad Zurzach, Switzerland

**Background:** Available evidence shows that the experience and perception of pain varies among different populations. Further, inequalities are reported in pain treatment across various types of pain and in different settings (1). In particular, it is unknown how much immigrants in Western European countries profit from pain management programs.

**Objectives:** The aim of this study was to detect differences in the course of Italian- and German-speaking patient's state of health and quality of life after a 4-week standardized interdisciplinary pain management program in German or in Italian.

**Methods:** The prospective cohort study with 61 Italian-speaking and 63 German-speaking patients with fibromyalgia or chronic back pain measured health-related quality of life, pain, anxiety and depression comparing at baseline, after 4 weeks of pain program and at 1 year follow-up. Differences between the two groups