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ORIGINAL ARTICLE

Comparison Between INSPIRE and Domjan method for measuring lumbar lateral flexion in patients of psoriatic arthritis (PsA) and correlation with radiographic damage

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Abstract

Objective Assessment of spinal lateral flexion (SLF) is important in spondyloarthritis (SpA). The INSPIRE method of measuring SLF requires one set of measurements, is faster, feasible, and correlates with the mSASSS in ankylosing spondylitis. The present study aimed to compare the INSPIRE to Domjan method in PsA patients and correlate with radiographic changes.

Methods Patients were selected from a cohort followed in a PsA clinic. Patients satisfying CASPAR criteria and having axial disease were identified. Clinical features were recorded. Examination included full spinal clinimetrics including measurement of INSPIRE and Domjan methods. Spine radiographs were scored for mSASSS by two assessors. Pearson correlation was used to correlate the values of spinal mobility measures and radiographic scores.

Results Two hundred twenty-nine patients were included in the study. The mean age at study entry was 51 years (16–83) and mean disease duration was 14 years (0.1–49). Forty and 47% of patients had radiographic evidence of unilateral or bilateral sacroiliitis. The mean modified Schober was 4.5 (1–8 cm), SLF-Domjan 16.5 (3.5–40 cm), SLF-INSPIRE 31.5 (8–60 cm), and mSASSS score 4(0–48). Correlation (95% CI) between INSPIRE and Domjan method was 0.87 (0.82, 0.90), between INSPIRE, Domjan method, and mSASSS were − 0.36 (− 0.50, − 0.20) and − 0.34 (− 0.49, − 0.18) respectively. All correlations were significant. Comparable correlations were obtained with comparisons made in patients of PsA with axial disease only.

Conclusion Both INSPIRE and Domjan methods correlate well as measures of SLF in PsA and correlate with radiographic damage. Therefore, the simpler INSPIRE method may be used to measure SLF in PsA.

Keywords Axial disease · Domjan · INSPIRE · Lumbar lateral flexion · Psoriatic arthritis

Introduction

Psoriatic arthritis (PsA) is a spondyloarthritis (SpA) defined as an inflammatory arthritis associated with psoriasis, usually seronegative for rheumatoid factor [1]. PsA is classified according to the CASPAR criteria [2]. Depending on the definition used, 25–70% of patients with PsA have axial involvement (AxPsA). Assessment of spinal mobility is an established practice in the evaluation and follow-up of SpA [3]. In ankylosing spondylitis (AS), spinal lateral flexion (SLF) measured by Bath Ankylosing Spondylitis Metrology Index (BASMI) [4] or Domjan method [5] correlates very well with radiographic damage of the spine. The INSPIRE (International Spondyloarthritis Interobserver Reliability Exercise) method of measuring SLF was developed during the INSPIRE study [6]. The INSPIRE method requires one set of measurements, is faster, feasible, and correlated with the modified Stoke Ankylosing Spondylitis Spine Score (mSASSS) in patients with AS. The aim of the present study was to compare the Domjan and INSPIRE method for measuring SLF in patients of PsA and to correlate the measurements with radiographic damage.

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Table 1 Patient characteristics and radiographic assessment

Characteristics	PsA ($N = 229$)	Axial PsA ($N = 125$)
Male (%)	130 (57)	84 (67)
Age at study entry* (year)	51(16–83)	52 (16–83)
Age at diagnosis of PsA* (year)	37 (6–79)	37 (10–79)
Duration of PsA* (year)	14 (0.1–49)	16 (0.3–47)
Actively inflamed joint count*	6 (0–49)	5 (0–40)
Damaged joint count*	7 (0–59)	9 (0–59)
Inflammatory spinal pain (%)	74 (32)	47 (38)
Unilateral sacroiliitis (%)	91 (40)	91 (73)
Bilateral sacroiliitis (%)	108 (47)	108 (86)
Syndesmophytes (%)	58 (25)	58 (46)
Degenerative spinal disease/DISH (%)	126 (55)	69 (55)
mSASSS	NR	4 (0–48)

NR not relevant; *mean (minimum-maximum)

Materials and methods

Patient selection

Patients satisfying the CASPAR criteria for PsA were selected from a longitudinal cohort followed in the PsA Clinic at the University of Toronto. AxPsA was defined as the presence of at least unilateral grade 2 sacroiliitis and/or the presence of syndesmophytes on spinal radiographs.

Ethics approval

The study was approved by the University Health Network Research Ethics Board.

Clinic methodology

In this clinic, detailed demographic data is collected and clinical evaluation performed every 6–12 months and tracked on a computerized database. Clinical features recorded systematically included the following: age, gender, ethnicity, age at symptom onset, age at diagnosis, family history, extra-articular manifestations, and medications. Clinical evaluation includes general physical examination and complete rheumatologic evaluation of peripheral joints and spine (joint counts, spinal clinimetrics) by trained rheumatologists.

Spinal lateral flexion

The INSPIRE and Domjan measures are obtained by standard techniques. Domjan method [5]: The patient stands against the wall with the heel and the shoulders touching the wall and the arms hanging straight by the side. A mark is made on the thigh at the tip of the middle finger on both sides. A second mark is made with the patient in maximum lateral flexion on both sides, without lifting the heels or bending the knees or elbows. The distance between the two marks on each side is measured by a tape measure and the mean of the two measures is the final score. INSPIRE method [6]: The patient stands as described above. Then the patient maximally flexes laterally to the right and a mark is made on the lower limb. Then the patient flexes maximally to the left without lifting the heels or bending the

Table 2 Spinal mobility measures

Measures	PsA ($N = 229$)	Axial PsA (N = 125)	Non AxPsA ($N = 104$)
Occiput-to-wall distance* (cm)	1.0 (0–17)	1.3 (0–17)	0.6 (0–9)
Tragus-to-wall distance* (cm)	12 (7–25)	12.3 (9–25)	11.6 (7–20.5)
Cervical rotation* (degrees)	71 (5–90)	67 (5–90)	76 (40–90)
Chest expansion* (cm)	6.1 (2–12)	6.2 (2–12)	5.9 (3–11.5)
Modified Schober* (cm)	4.5 (1–8)	4.3 (1–7.5)	4.8 (2–8)
Intermalleolar distance* (cm)	104 (25–147)	103 (25–146)	105.5 (40–147)
Domjan method* (cm)	16.5 (3.5–40)	16.4 (4–40)	16.5 (3.5–27)
INSPIRE method* (cm)	31.5 (8–60)	31.2 (8–60)	31.9 (9.5–55)

*mean (minimum-maximum)

Table 3 Correlation between INSPIRE and Domjan methods, and mSASSS scores in AxPsA

Covariates	Correlation	95% CI	*p* value
INSPIRE and Domjan	0.87	0.82, 0.90	< 0.001
INSPIRE and mSASSS	− 0.36	− 0.50, − 0.20	< 0.001
Domjan and mSASSS	− 0.34	− 0.49, − 0.18	< 0.001

knees or elbows and a mark is again made on the right side. The distance between the marks when the patient flexes laterally to the right and left is taken as the final score.

Radiology

Radiographic evaluation of the peripheral joints and spine is done every 2 years. The radiographs taken closest to the clinical assessment were scored for the modified Stoke Ankylosing Spondylitis Spine Score (mSASSS) by consensus and read by two assessors.

Statistical analysis

Descriptive statistics were used to describe the patients included in the study. Pearson correlation was used to correlate the INSPIRE and Domjan methods of measurement of spinal lateral flexion as well as to correlate these measurements with radiographic scores.

Results

Two hundred twenty-nine patients were included in the study of whom 43% were female. The patient characteristics, presence or absence of sacroiliitis, syndesmophytes, and degenerative changes of PsA and AxPsA patients are shown in Table 1. The mean age at study entry was 51 years (16–83) and the mean age at onset of PsA was 37 years. Fifty-five percent had evidence of degenerative spinal disease. The spinal mobility measures are shown in Table 2. Correlation (95% confidence interval) between INSPIRE and Domjan method was 0.87 (0.82, 0.90), between INSPIRE, Domjan methods, and mSASSS were − 0.36 (− 0.50, − 0.20) and − 0.34 (− 0.49, − 0.18) respectively (Table 3). All correlations had a *p* value of < 0.001.

Table 4 Comparing INSPIRE and Domjan measurements in PsA patients with and without AxPsA

Measurement (mean; cm)	AxPsA	No AxPsA	*p* value
INSPIRE	31.2	31.9	0.478
Domjan	16.4	16.5	0.793

Similar results were obtained when correlations were determined in all patients with PsA (results not shown). Also, comparable values were obtained for measurements obtained for INSPIRE and Domjan methods in patients of PsA with or without AxPsA (Table 4).

Discussion

This study compares the INSPIRE and Domjan methods for measurement of SLF in patients of PsA with or without axial disease in a large longitudinal cohort of patients. All the measurements were taken by trained rheumatologists. Both methods correlated very well in patients with PsA with and without AxPsA. Both methods show similar correlation with radiographic damage assessed with the mSASSS score. It is pertinent to note that the mean age at entry into the study was 51 years, which is almost a decade or two older than what would be expected for AS. Consequently, the reported percentage of degenerative spinal changes is also more and that may have bearing on the spinal mobility measures and mSASSS scoring. Degenerative thoracolumbar spinal disease, which may affect measures of SLF, was slightly more in those without AxPsA (49% Vs 44%) and could explain the lower "maximum" values of Domjan and INSPIRE methods in those without AxPsA (Table 2). The INSPIRE method is faster as it requires only one set of measurements; this is advantageous in a busy clinic when multiple clinimetrics need to be performed or when the patient has significant back pain.

Thus, the INSPIRE method of assessment of SLF has face and criterion validity and is comparable to the Domjan method. If the two methods show a similar sensitivity to change, they may be used interchangeably in patients with PsA.

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Compliance with ethical standards

Disclosures None.

References

1. Gladman DD (2004) Psoriatic arthritis. In: Harris ED, Budd RC, Firestein GS et al (eds) Kelley's textbook of rheumatology, 7th edn. W.B. Sounders, Philadelphia, pp 1155–1164
2. Taylor W, Gladman D, Helliwell P, Marchesoni A, Mease P, Mielants H, CASPAR Study Group (2006) Classification criteria for psoriatic

arthritis: development of new criteria from a large international study. Arthritis Rheum 54:2665–2673
3. Chandran V, O'shea FD, Schentag CT, Inman RD, Gladman DD (2007) Relationship between spinal mobility and radiographic damage in ankylosing spondylitis and psoriatic arthritis: a comparative analysis. J Rheumatol 34:2463–2465
4. Jenkinson TR, Mallorie PA, Whitelock HC, Kennedy LG, Garrett SL, Calin A (1994) Defining spinal mobility in ankylosing spondylitis (AS). The Bath AS Metrology Index. J Rheumatol 21:1694–1698
5. Domjan L, Nemes T, Balint GP, Toth Z, Gomor B (1990) A simple method for measuring lateral flexion of the dorsolumbar spine. J Rheumatol 17:663–665
6. Gladman DD, Inman R, Cook R, van der Heijde D, Landewé RB, Braun J, Davis JC, Mease P, Brandt J, Vargas RB, Chandran V, Helliwell P, Kavanaugh A, O'Shea FD, Khan MA, Pipitone N, Rahman P, Reveille JD, Stone MA, Taylor W, Veale DJ, Maksymowych WP (2007) International spondyloarthritis interobserver reliability exercise-the INSPIRE study: I. Assessment of spinal measures. J Rheumatol 34:1733–1739