Comparison of modified disease activity scores with original composite scores for prediction of structural damages in rheumatoid arthritis: data from the ESPOIR cohort.

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Key message : no difference between original and modified disease-activity scores was found to predict radiographic damage in patients with rheumatoid arthritis.

Rheumatoid arthritis (RA) activity is assessed using a number of composite scores; the most widely used being the Disease Activity Score in 28 joints (DAS28), the Simplified Disease Activity Index (SDAI) and the Clinical Disease Activity Score (CDAI). [1-2] Baker *et al*. recently used study data from two clinical trials on golimumab (GO-BEFORE and GO-FORWARD) to develop a modified version of the DAS (M-DAS28), SDAI (M-SDAI) and CDAI (M-CDAI) based on widely available clinical measures such as swollen joint count (SJC), evaluator global assessment of disease activity using visual analogic scale (EvGA), and CRP level. [3]These scores showed superior correlation with MRI detection of synovitis and more accurately predicted radiographic progression at 12 months compared to DAS28 and SDAI. Consequently, these modified measures need to be evaluated in independent studies to determine their validity. Nieuwenhuis et al. compared the original and modified measures in the Leiden Early Arthritis Cohort and reported only marginal differences between correlation coefficients for M-DAS28 and DAS28 on radiographic progression. [4] Here we set out to compare the performances of these modified scores and the original ones in terms of ability to predict radiographic progression using data from the ESPOIR cohort, a French nationwide observational study of 813 patients with early (less than 6 months) arthritis. [5]

Here we selected patients who fulfilled the American College of Rheumatology (ACR) / European League against Rheumatism (EULAR) 2010 criteria for RA at least once within the first 5 years of follow-up with at least a Sharp/van der Heijde (SHS) score at baseline and at 12-months of follow-up (n=590).[6] The objective, design and patients characteristics of the ESPOIR cohort are described elsewhere. [5] Disease activity at baseline was assessed by conventional scores: DAS-28-ESR = 0.56 (TJC28) + 0.28 (SJC28)+ 0.70ln (ESR) + 0.14 (PtGA); DAS28-CRP = 0.36 × ln(CRP + 1) + 0.28 (SJC) + 0.56 (TJC28) + 0.14 (PtGA); SDAI = TJC28 + SJC28 + PtGA+ EvGA + CRP ; CDAI = TJC28 + SJC28 + PtGA + EvGA. Modified disease activity scores at baseline were calculated as previously described [3] : M-DAS28-ESR = 0.40 × ln (ESR) + 0.17 (SJC28) + 0.26 (EvGA); M-DAS28-CRP = 0.49 × ln (CRP) + 0.15 (SJC28) + 0.22 (EvGA) + 1; M-SDAI = CRP + SJC28 + EvGA.; M-CDAI= SJC + 2 (EvGA). Radiographicprogression was defined as a $\geq$1 change in SHS score between baseline and 1 year of follow-up.

The relations between modified disease activity scores (M-DAS, M-CDAI and M-SDAI) or original composite scores with radiographic progression were studied using correlation coefficients (Pearson or Spearman according to statistical distribution). Areas under the curve (AUC-ROC) were calculated and presented with 95% confidence intervals. AUC-ROC were compared via the Hanley & McNeil approach with Sidak's correction to take into account multiple comparisons.

Of the 590 patients, 78% were women, mean age was 48.8 years, mean symptoms duration was 16.1 years. The median SJC was 7.8, mean TJC was 9.1, the mean EvGA was 5.2 cm, the median CRP was 21.6 mg/L, the median ESR was 29 mm at the 1st hour.

Correlations of the original and the modified scores with radiographic progression after 1 year are shown in table 1. Ability to predict radiographic progression after 1 year was the same between baseline M-DAS28-ESR and DAS28-ESR (both AUC: 0.53). The AUC of the M-DAS28-CRP was slightly higher than DAS28-CRP (AUC: 0.54 *vs* 0.52 respectively), but these differences did not yield statistical significance. The same was true for M-SDAI and SDAI (AUC: 0.52 *vs* 0.51 respectively), M-CDAI and CDAI (AUC: 0.51 *vs.* 0.50 respectively).

In conclusion we found no difference between original disease-activity scores (DAS28-ESR, DAS28-CRP, SDAI and CDAI) and modified disease activity scores (M-DAS28-ESR, M-DAS28-CRP, M-CDAI and M-SDAI) in terms of ability to predict radiographic damage at 12-months of follow-up in patients with rheumatoid arthritis. Here, as in Baker et al. and the Leiden early arthritis cohort, we found modest overall correlation between all clinical indices and radiographic progression (all AUCs<0.60), suggesting that there is still room for improvement in terms of quantifying RA activity for predicting radiographic progression.

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