Disease Activity Trajectories for Early and Established Rheumatoid Arthritis: Results From The Ontario Best Practices Research Initiative (OBRI)

Mohammad Movahedi[1,2], Angela Cesta[1], Xiuying Li[1], Claire Bombardier[1,3,4] and OBRI investigators

[1]Toronto General Hospital Research Institute, University Health Network, Toronto, ON; [2] Institute of Health Policy, Management, and Evaluation (IHPME), University of Toronto, Toronto, ON; [3]Division of Rheumatology, Mount Sinai Hospital, University of Toronto, Toronto, ON; [4]Department of Medicine and IHPME, University of Toronto, Toronto, ON

BACKGROUND

- Disease activity status in patients with rheumatoid arthritis (RA) at fixed time points modelled as continuous (e.g. number of swollen joints counts) and dichotomous variables (e.g. remission or low disease status using composite measures) do not reflect the patient's disease course in chronic and relapsing RA.

OBJECTIVES

- To describe longitudinal disease activity trajectories in early and established RA patients participating in the Ontario Best Practices Research Initiative (OBRI); a clinical registry (OBRI-RA registry) (www.obri.ca).

METHODS

- Patients enrolled in the OBRI between 1st January 2008 - 1st January 2019
- Patients with available data to calculate the DAS28-ESR over 2 years of follow-up:
  - Early RA (disease duration <=1 year)
  - Established RA (disease duration >1 year)
- Statistical analysis:
  - Using latent growth curve modeling (LCGM), subgroups of patients following distinct pattern of DAS28-ESR change over time were identified
  - Model selection was based on Bayesian information criterion (BIC)

RESULTS

- A total of 1273 patients were included, 454 (36%) with early and 819 (64%) with established RA (Table 1).
- Compared to established RA, patients with early RA were significantly younger (57.3 vs. 59.1 years) and had a lower mean number of comorbidities (3.3 vs. 3.6), were less likely to be RF-positive (70.3% vs. 76.8%), use bDMARDs (7.0% vs. 29.2%), and more likely to be current smokers (18.7% vs. 14.4%) (Table 1).

Table 1. Patients Profile at Enrolment

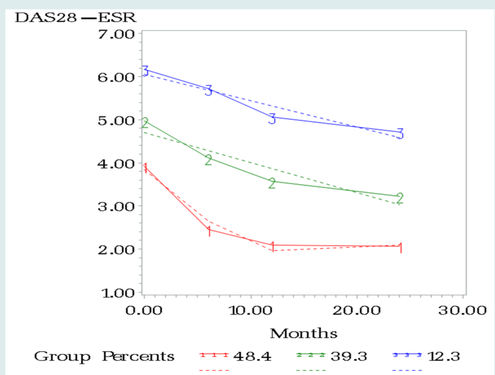
	Early RA (N=454)	Established RA (N=918)	P-value
Demographic Factors			
- Age, years, mean (SD)	57.3 ± 13.4	59.1 ± 12.3	***0.016***
- Sex, Female, n (%)	326 (71.8)	668 (81.6)	***<.001***
- Education status, post-secondary, n (%)	254 (55.9)	460 (56.2)	*0.921*
- Current smoker, n (%)	85 (18.7)	118 (14.4)	*0.078*
Disease Factors			
- Disease duration since diagnosis, years, mean (SD)	0.3 ± 0.5	12.0 ± 9.4	***<.001***
- RF positive, n (%)	308 (70.3) (n=438)	588 (76.8) (n=766)	**0.01**
- CRP, mg/L, mean (SD)	16.1 ± 24.6	11.7 ± 19.6	***<.001***
- SJC-28, mean (SD)	6.1 ± 5.2	5.7 ± 4.9	*0.273*
- TJC-28, mean (SD)	7.2 ± 6.7	6.1 ± 6.1	***0.005***
- PtGA (0-10), mean (SD)	5.1 ± 2.7	4.7 ± 2.8	***0.008***
- PhGA (0-10), mean (SD)	4.8 ± 2.5	4.2 ± 2.5	***<.001***
- CDAI (0-76), mean (SD)	23.1 ± 14.0	20.7 ± 13.7	***0.003***
- HAQ-DI(0-3), mean (SD)	1.1 ± 0.70	1.2 ± 0.80	*0.528*
Comorbidities			
- Number of main comorbidities, mean (SD)	3.3 ± 2.3	3.6 ± 2.5	***0.013***
- CVD, n (%)	55 (12.1)	137 (16.7)	***0.028***
- Hypertension, n (%)	160 (35.2)	311 (38.0)	*0.334*
- Diabetes Mellitus, n (%)	43 (9.5)	80 (9.8)	*0.864*
Medication Factors			
- Prior use of bDMARDs, n (%)	26 (5.7)	319 (38.9)	***<.001***
- Prior use of csDMARDs, n (%)	237 (52.5)	792 (86.7)	***<.001***
- Current bDMARDs use, n (%)	32 (7.0)	239 (29.2)	***<.001***
- Current csDMARDs use, n (%)	413 (91.0)	730 (89.1)	*0.300*
- Current steroid use, n (%)	115 (25.3)	150 (18.3)	***0.003***

RF: Rheumatoid factor; SJC: Swollen Joint Count; TJC: Tender Joint Count; PhGA: Physician Global Assessment; PtGA: Patient Global Assessment; CRP: C-reactive Protein; CDAI: Clinical Disease Activity Index; CVD: Cardiovascular Disease; bDMARDs: biologic disease modifying antirheumatic drugs; csDMARDs: conventional synthetic disease modifying antirheumatic drugs.

Early RA (Figure 1):

- In patients with high DAS28-ESR at baseline, 12.3% moved to a moderate DAS28-ESR after two years (group 3)
- In patients with moderate DAS28-ESR at baseline, 39.3% reached LDA/REM after two years (group 2)
- In patients with moderate DAS28-ESR at baseline, 48.4% reached remission after two years (group 1)

Figure 1. Observed (dashed lines) and fitted trajectories (solid lines) from 3-class latent growth curve analysis for disease course over 2 years in patients with early RA (n=454)

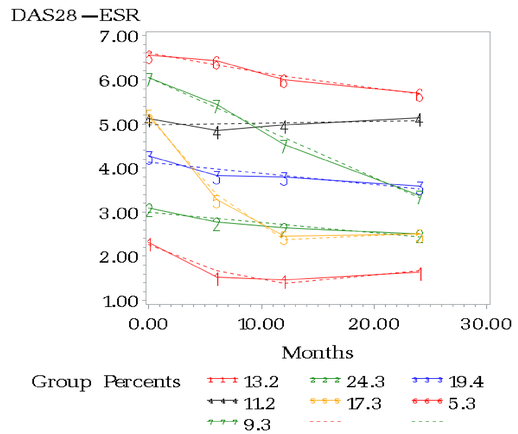


DAS28-ESR definition:
High DAS: >5.1; Moderate: >3.2 and <= 5.1; Low/REM: <=3.2; REM: <=2.6

Established RA (Figure 2):

- In patients with high DAS28-ESR at baseline, 16.5% remained high after two years (group 6 and 4; red and black line)
- In patients with high DAS28-ESR at baseline, 26.6% had an improvement after two years (17.3% remission and 9.3% moderate; group 7 and 5; green and yellow line)
- In patients with moderate to low DAS28-ESR at baseline, 43.7% remained the same after two years (group 2 and 3; blue and green line)
- In patients with remission at baseline, 13.2% remained in remission after two years (group 1; red line)

Figure 2. Observed (dashed lines) and fitted trajectories (solid lines) from 7-class latent growth curve analysis for disease course over 2 years in patients with established RA (n=918)



CONCLUSIONS

- Disease course is different in early versus established RA. While 70% of early RA patients with moderate or high disease profiles reached remission, only 17% of established RA patients with high disease activity achieved remission after 2 years of follow-up.
- These findings suggest the potential effects of receiving early treatment and health care. The impact of sociodemographic, clinical and medication profile on disease course will be examined as future work for this study.

Funding: OBRI was funded by peer reviewed grants from CIHR (Canadian Institute for Health Research), Ontario Ministry of Health and Long-Term Care (MOHLTC), Canadian Arthritis Network (CAN) and unrestricted grants from: Abbvie, Amgen, Janssen, Medexus, Merck, Novartis, and Pfizer.
Acknowledgment: Dr. Bombardier held a Canada Research Chair in Knowledge Transfer for Musculoskeletal Care and a Pfizer Research Chair in Rheumatology

Correspondence to: OBRI at: obri@uhnresearch.ca

OBRI Investigators: Drs. Ahluwalia, V., Ahmad, Z., Akhavan, P., Albert, L., Alderdice, C., Aubrey, M., Aydin, S., Bajaj, S., Bell, M., Bensen, W., Bhavsar, S., Bobba, R., Bombardier, C., Bookman, A., Brophy, J., Cabral, A., Carette, S., Carmona, R., Chow, A., Choy, G., Ciaschini, P., Cividino, A., Cohen, D., Dixit, S., Faraawi, R., Haaland, D., Hanna, B., Haroon, N., Hochman, J., Jaroszynska, A., Johnson, S., Joshi, R., Kagal, A., Karasik, A., Karsh, J., Keystone, E., Khalidi, N., Kuriya, B., Lake, S., Larche, M., Lau, A., LeRiche, N., Leung, Fe., Leung, Fr., Mahendira, D., Matsos, M., McDonald-Blumer, H., McKeown, E., Midzic, I., Milman, N., Mittoo, S., Mody, A., Montgomery, A., Mulgund, M., Ng, E., Papneja, T., Pavlova, P., Perlin, L., Pope, J., Purvis, J., Rai, R., Rohekar, G., Rohekar, S., Ruban, T., Samadi, N., Sandhu, S., Shaikh, S., Shickh, A., Shupak, R., Smith, D., Soucy, E., Stein, J., Thompson, A., Thorne, C., Wilkinson, S.