



# Long-term Quality of life, Productivity impairment, Disease severity and Health care costs in relation to functional impairment in Psoriatic arthritis patients in the Czech Republic

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## Background/Purpose

Our aim was to describe the quality-of-life (QoL), productivity impairment, clinical indicators and health care costs in relationship to functional status described by Health assessment questionnaire (HAQ) in psoriatic arthritis (PsA) patients in three-year follow-up.

## Methods

This is a prospective multicenter non-interventional observational study with PsA patients in 4 specialized centers for treatment of rheumatic diseases in the Czech Republic. A two-year follow-up with 6 months period between each time point observation is ongoing. The data presented here comes from the first visit and three subsequent visits (i.e. time 0, 6, 12 and 18 months). The demographic, clinical, QoL and productivity data were directly collected from patients. Health care consumption was assessed retrospectively reviewing individual patient's medical record. Health care expenditures are presented as average yearly costs per patient observed within the first year of observation. Clinical data were described by DAPsA, QoL measured by EQ-5D, work impairment by Work Productivity and Activity Impairment (WPAI) with respect to HAQ categories. We collected all costs directly related to PsA (medication, out/in-patient care, examinations and out-of-pocket expenditures).

## Statistical analysis

A linear regression model was performed to identify the main factors associated with HAQ. Fixed effect model was performed with patients having 2 and 3 follow-up visits and explored the relationship between HAQ, EQ-5D and DAPsA. Statistical analyses were performed in STATA 13.1. Additionally, we tested for the differences in characteristics between the groups treated/not treated with biologics using Mann-Whitney test; correlation between variables was tested using non-parametric Spearman's correlation coefficient.

## Results

We have already included 203 patients with PsA, 67 on biological drugs, mean patient age was 57.3 years, mean time from diagnoses of PsA was 13.1 years, 54.7% were female. With higher functional impairment, described by HAQ, there is an increase in age, time from diagnoses, percentage of work impairment and also decrease in work-active patients. There is also deterioration in DAPsA and QoL observed with higher HAQ. See the results in table 1 & 2; values presented as means. Interestingly, the patients on biologics are similar to patients not treated with biologics in several characteristics: HAQ, time from diagnosis, % of work active, WPAI, EQ-5D; nevertheless, patients on biologics have significantly lower age, higher costs and lower DAPsA.

Variables that revealed the highest correlation with the HAQ are EQ-5D (QoL), DAPsA and total costs (in patients without biologics). The Spearman correlation coefficient is equal to -0.78, 0.56 (see fitted values in Figure 1) and 0.37, respectively in EQ-5D, DAPsA and total costs. Figure 2 shows simple linear regression between HAQ and EQ-5D.

We performed linear regression analysis of all patients during their initial visit (n=203), HAQ was used as the dependent variable (Table 3). In the regression model were found gender, age, age<sup>2</sup>, DAPsA, EQ-5D, and total costs as the significant predictors of HAQ. Biological treatment had borderline significance (p=0.069). More specifically, an increase by one unit of DAPsA resulted in an increase in HAQ of 0.011. Additionally, an increase in EQ-5D from, for instance, 0.8 to 0.9 resulted in a decrease in HAQ by 0.21 points. Interestingly age and age<sup>2</sup> are significant but age is with negative sign and age<sup>2</sup> with positive sign which means decreasing HAQ with age in decreasing rate (U-shape). The presence of biological treatment meant lower HAQ by 0.321. The regression model as whole captured 69% of variability. Figure 2 shows the fitted values (at means) between HAQ and EQ-5D.

The results of fixed effect models are presented in Table 4 and 5 for two and three follow-up visits respectively (in total, three and four visits including the first visit). This type of regression can analyze only individually changing characteristics and allows for controlling the individual heterogeneity and unobserved effects. The results show lower magnitude of both EQ-5D and DAPsA compared to previous cross-sectional regression model but DAPsA was no longer statistically significant. This may be caused by smaller changes in both parameters within individual patients in the follow-up period.

## Conclusions

Patients with worse functional impairment revealed more significant impairment of their QoL, work productivity, worse clinical outcomes and higher costs (in non-biologic treated patients). There is a trend of decreasing number of work active patients who are not on biologics but this trend is not statistically significant. For patients not treated with biologics, HAQ as a tool is a relatively good cost predictor, contrary to ones on biologics since the magnitude of biological costs diminish the differences. There have not been observed substantial changes in DAPsA and EQ-5D data in the follow-up period, probably due to relatively short period (18 months) with respect to the disease natural progression rate. The findings attributed to higher HAQ impairment (HAQ > 2.0) and to patients treated with biologics should be interpreted with caution because of lower number of patients in these categories. We consider our findings highly helpful to decision-makers in the reimbursement process/optimization of particular intervention.

**Table 1 - Initial visit (time 0) of PsA patients**

| HAQ category      | HAQ         | No.       | Age*        | Patients on biologic drugs |            |               |                  |            |             |              |
|-------------------|-------------|-----------|-------------|----------------------------|------------|---------------|------------------|------------|-------------|--------------|
|                   |             |           |             | Time from Dx (years)       | % women    | Costs (EUR)*  | % of work active | % WPAI     | DAPsA*      | EQ-5D        |
| 0-0.5>            | 0.13        | 32        | 48.7        | 12.6                       | 47%        | 11,149        | 81%              | 12%        | 7.3         | 0.848        |
| 0.5-1.0>          | 0.74        | 12        | 53.3        | 11.7                       | 58%        | 11,446        | 50%              | 24%        | 10.7        | 0.688        |
| 1.0-1.5>          | 1.24        | 12        | 51.8        | 11.3                       | 58%        | 11,895        | 42%              | 31%        | 21.8        | 0.632        |
| 1.5-2.0>          | 1.77        | 8         | 63.3        | 17.0                       | 38%        | 11,846        | 0%               | na         | 25.2        | 0.495        |
| 2.0-2.5>          | 2.42        | 3         | 59.7        | 23.3                       | 67%        | 12,437        | 33%              | na         | 32.5        | 0.375        |
| 2.5-3.0>          | na          | 0         | na          | na                         | na         | na            | na               | na         | na          | na           |
| <b>Mean/total</b> | <b>0.73</b> | <b>67</b> | <b>52.3</b> | <b>13.2</b>                | <b>51%</b> | <b>11,477</b> | <b>57%</b>       | <b>16%</b> | <b>13.8</b> | <b>0.718</b> |

| HAQ category      | HAQ         | No.        | Age         | Patients without biologic drugs |            |             |                  |            |             |              |
|-------------------|-------------|------------|-------------|---------------------------------|------------|-------------|------------------|------------|-------------|--------------|
|                   |             |            |             | Time from Dx (years)            | % women    | Costs (EUR) | % of work active | % WPAI     | DAPsA       | EQ-5D        |
| 0-0.5>            | 0.16        | 63         | 56.4        | 13.0                            | 44%        | 321         | 63%              | 14%        | 12.2        | 0.800        |
| 0.5-1.0>          | 0.85        | 34         | 60.7        | 13.0                            | 68%        | 394         | 38%              | 27%        | 17.4        | 0.683        |
| 1.0-1.5>          | 1.31        | 26         | 61.5        | 12.3                            | 58%        | 369         | 19%              | 30%        | 19.6        | 0.538        |
| 1.5-2.0>          | 1.81        | 4          | 65.5        | 13.0                            | 50%        | 842         | 50%              | 45%        | 42.6        | 0.586        |
| 2.0-2.5>          | 2.29        | 3          | 73.7        | 18.3                            | 100%       | 1,854       | 0%               | na         | 28.9        | 0.381        |
| 2.5-3.0>          | 2.79        | 6          | 71.2        | 13.5                            | 100%       | 3,141       | 0%               | na         | 40.6        | 0.224        |
| <b>Mean/total</b> | <b>0.77</b> | <b>136</b> | <b>59.8</b> | <b>13.0</b>                     | <b>57%</b> | <b>522</b>  | <b>44%</b>       | <b>19%</b> | <b>17.4</b> | <b>0.680</b> |

| Whole patient cohort |             |            |             |             |            |              |            |            |             |              |
|----------------------|-------------|------------|-------------|-------------|------------|--------------|------------|------------|-------------|--------------|
| <b>Mean/total</b>    | <b>0.76</b> | <b>203</b> | <b>57.3</b> | <b>13.1</b> | <b>55%</b> | <b>4,138</b> | <b>48%</b> | <b>18%</b> | <b>16.3</b> | <b>0.692</b> |

Notes: \* the mean values of given patient characteristics on and without biologic drugs differ significantly with p<0.05 using Mann-Whitney test.

**Table 2 - Follow-up observations**

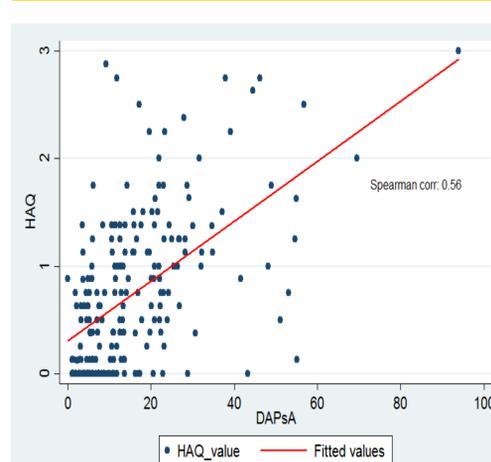
|                               | 1st visit |           |           | 2nd visit |           |           | 3rd visit |          |           | 4th visit |          |          |
|-------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|-----------|-----------|----------|----------|
|                               | Bio       | w/o Bio   | Whole     | Bio       | w/o Bio   | Whole     | Bio       | w/o Bio  | Whole     | Bio       | w/o Bio  | Whole    |
| <b>Mean/total HAQ</b>         | 0.73      | 0.77      | 0.76      | 0.78      | 0.85      | 0.85      | 0.82      | 0.85     | 0.84      | 1.00      | 0.78     | 0.88     |
| <b>No. (% of work active)</b> | 67 (57%)  | 136 (44%) | 203 (48%) | 51 (53%)  | 107 (47%) | 158 (49%) | 42 (45%)  | 89 (47%) | 131 (47%) | 20 (45%)  | 24 (42%) | 44 (43%) |
| <b>% WPAI</b>                 | 16%       | 19%       | 18%       | 24%       | 17%       | 20%       | 28%       | 15%      | 19%       | 23%       | 19%      | 21%      |
| <b>DAPsA</b>                  | 15.6      | 18.4      | 17.5      | 16.2      | 17.0      | 16.7      | 13.8      | 15.4     | 14.9      | 12.8      | 16.1     | 14.6     |
| <b>EQ-5D</b>                  | 0.718     | 0.680     | 0.692     | 0.710     | 0.696     | 0.701     | 0.695     | 0.719    | 0.711     | 0.687     | 0.731    | 0.711    |

Bio – patients on biologic treatment; w/o - patients without biologic treatment; Whole – Whole cohort of patients

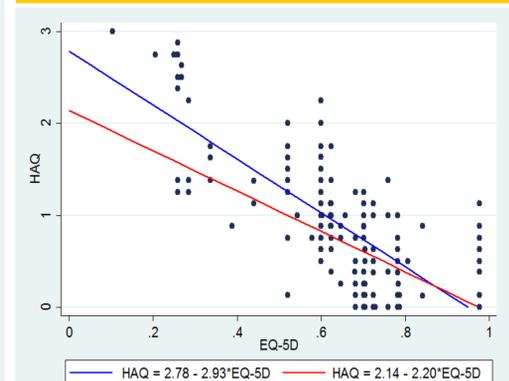
**Table 3 – HAQ as a function of age, sex, DAPsA, EQ-5D, costs in EUR (Ln-transformed costs): Results from multivariate linear regression analysis (n=203)**

|                      | Coefficient | P-value |
|----------------------|-------------|---------|
| Intercept            | 1.489       | 0.008   |
| Age                  | -0.029      | 0.035   |
| Age <sup>2</sup>     | 0.0003      | 0.009   |
| Female               | 0.118       | 0.048   |
| Biological treatment | -0.282      | 0.069   |
| DAPsA                | 0.011       | 0.000   |
| EQ-5D                | -2.197      | 0.000   |
| Ln-transformed costs | 0.119       | 0.001   |

**Figure 1 – scatter plot describing relationship between HAQ and DAPsA**



**Figure 2 – scatter plot describing relationship between HAQ and EQ-5D. Blue line: fitted values from linear regression between HAQ and EQ-5D. Red line: fitted values (at means) from linear regression from Table 3**



**Table 4 – HAQ as a function of DAPsA and EQ-5D. The results from fixed-effect model estimation using 2 follow-up visits (n=131, time =3 periods, total observation = 393)**

|           | Coefficient | P-value |
|-----------|-------------|---------|
| Intercept | 1.427       | 0.000   |
| DAPsA     | -0.002      | 0.386   |
| EQ-5D     | -0.971      | 0.000   |

**Table 5 – HAQ as a function of DAPsA and EQ-5D. The results from fixed-effect model estimation using 3 follow-up visits (n=44, time =4 periods, total observation = 176)**

|           | Coefficient | P-value |
|-----------|-------------|---------|
| Intercept | 1.133       | 0.000   |
| DAPsA     | -0.003      | 0.285   |
| EQ-5D     | -0.491      | 0.019   |

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