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Real world effectiveness and rheumatologist satisfaction with secukinumab in the treatment of patients with axial spondyloarthritis

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Running title: Real world effectiveness of secukinumab in axSpA patients

Keywords: axial spondyloarthritis, patient reported outcomes, real world effectiveness, secukinumab, treatment duration

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Abstract

Objectives: To assess the effectiveness of secukinumab in patients with axSpA treated in routine clinical settings in 5 European countries

Methods: Retrospective analysis of a cross-sectional survey to assess real-world effectiveness of secukinumab in the management of axSpA and rheumatologist satisfaction with treatment in France, Germany, Italy, Spain and the UK from March to December 2018. Outcomes collected included patient demographics, clinical characteristics and rheumatologist- and patient-reported satisfaction with secukinumab treatment.

Results: 537 patients receiving secukinumab for more than 4 months were assessed, 359 of whom were diagnosed with AS and 178 with nr-axSpA. Rheumatologist assessment of disease status at treatment initiation indicated that 39 (7.3%) had stable/improving disease. Secukinumab treatment for 4 months or longer resulted in 515 (95.9%) patients judged as stable/improving. Treatment was associated with benefits from initiation to assessment in terms of BASDAI (6.2 vs 2.8), 44-joint count score (9.7 vs 6.6), rheumatologist global VAS score (56.9 vs 23.0) and patient global VAS scores (64.4 vs 25.5). These benefits for key clinical outcomes were sustained for periods of 12 months or longer. Patient reported outcomes on health status using EQ-5D, global functioning using the ASAS health index and overall work impairment via WPAI were sustained over the treatment period while patient and rheumatologist satisfaction with secukinumab treatment remained very high at 80.2 and 91.2% respectively

Conclusion: Consistent benefits across multiple clinical and patient-reported outcomes were seen with secukinumab treatment in patients with AS and nr-axSpA treated in routine clinical settings across five European countries

Key points

- *In routine clinical settings across five European countries, secukinumab treatment resulted in improvements in a wide range of clinical outcomes including physician-reported disease severity, disease status, pain, BASDAI, 44-joint count score and global VAS scores*
- *Key clinical and patient reported outcomes were sustained for a 12 month period or longer with secukinumab treatment*
- *Rheumatologist- and patient-reported treatment satisfaction was high with secukinumab*

Introduction

Axial spondyloarthritis (axSpA) is a chronic, inflammatory rheumatic disease that affects predominantly the axial skeleton, causing severe pain, stiffness and fatigue and ultimately reduced quality of life [1,2]. Definitive structural damage of sacroiliac joints visible on X-rays leads to radiographic axSpA (r-axSpA) known as ankylosing spondylitis (AS), whilst patients who do not have clear radiographic damage of sacroiliac joints, are classified as non-radiographic axSpA (nr-axSpA) [3].Radiographic forms of the disease can take years to develop, complicating diagnosis and potentially delaying management of patients with early stage disease who may not show evidence of damage in the sacroiliac joints, which may be irreversible [4,5].Both radiographic and non-radiographic are considered part of one spectrum of conditions (axSpA) although some patients may not progress beyond non-radiographic forms to established AS [3,6].

The disease commonly starts in the third decade of life with a male to female ratio of two to one for radiographic and of one to one for non-radiographic forms [1]. Initial recommended treatment involves non-steroidal anti-inflammatory drugs (NSAIDs) but frequently these drugs do not control symptoms and may have safety issues associated with chronic use, [7] while conventional synthetic disease-modifying anti-rheumatic drugs (csDMARDs) are less efficacious in axial disease than peripheral disease [8-10].

Tumour necrosis factor inhibitor (TNFi) therapy was the first biologic recommended for patients with persistent disease activity despite the use of conventional treatment [7,11]. Large registry analysis demonstrated decreasing retention rates for 2nd and 3rd line TNFi therapy compared with first-line TNF inhibitor therapy, and lower response rates with increasing number of previous TNFi [12].

To expand the therapeutic options for patients diagnosed with axSpA, inhibitors of interleukin-17A (IL-17i) were developed, secukinumab being the first in the IL-17i class. IL-17 is a key cytokine that mediates immune responses and plays a pivotal role in the disease [13]. Secukinumab has demonstrated clinical benefits in patients with active AS in multiple phase III clinical trials with significant improvements in the signs and symptoms at week 16 that were sustained over a long-term period [14]. Secukinumab improved signs and symptoms of AS over a period of 2 years with no unexpected safety findings with evidence of low mean progression for spinal radiographic changes. [15] Secukinumab also showed rapid and sustained relief of pain and fatigue over 2 years in patients with AS regardless of baseline CRP levels and prior TNF inhibitor therapy [16]. Long-term efficacy and safety results over a period of 5 years confirmed the effectiveness of secukinumab in the treatment of patients with AS and showed sustained improvement in signs, symptoms and physical function with a consistent safety profile to that seen previously [17,18].

Subsequently secukinumab has been approved for use in the treatment of nr-axSpA in Europe and the US based on results from the PREVENT phase III study demonstrating significant and sustained improvement in signs and symptoms of patients with nr-axSpA through 52 weeks [19]. Further support for the broad and favourable safety profile of secukinumab stems from the integrated safety analysis of data derived from clinical trials across patients with psoriasis, psoriatic arthritis and ankylosing spondylitis together with post marketing surveillance data. Long-term treatment was associated with a low frequency of adverse events with no additional or unexpected events [20].

As clinical trials are often associated with stringent inclusion and exclusion criteria, such trials do not fully reflect real-world clinical experience and patients normally encountered in routine settings. Real world data supporting the clinical safety and efficacy of drugs seen in phase III clinical studies lend strong support to effectiveness in routine clinical practice. This study assessed the effectiveness of secukinumab in patients with axSpA treated in routine clinical settings in 5 European countries to provide further information on the impact of treatment on clinical outcomes and patient-reported outcomes (PROs).

Methods

The current study represents a retrospective analysis of a cross-sectional survey assessing real-world effectiveness of secukinumab in the treatment of axSpA and rheumatologist-reported satisfaction with treatment. The study uses data collected as part of the Adelphi Disease Specific Programme (DSP) conducted in France, Germany, Italy, Spain and the UK from 01 March 2018 to 30 December 2018. The DSP is an established methodology widely used across multiple disease areas [21].

Study design and data

The study collected data from questionnaires completed by rheumatologists from France, Germany, Italy, Spain, and the UK who were practicing at the time of enrolment and were currently treating patients with axSpA. Enrolled rheumatologists completed questionnaires (physician-reported questionnaires) for up to 5 consecutive adult patients' consultations with a diagnosis of axSpA (AS or nr-axSpA) who had been taking secukinumab for a minimum of 4 months.

Rheumatologists were eligible to participate if they had 3-30years' experience and were making treatment decisions for patients with axSpA. This study included patients who, at the time of data collection, had a rheumatologist-confirmed diagnosis of axSpA (AS or nr-axSpA) and were aged 18 years or older. Patients included in this analysis had complete data from the initiation of secukinumab up to the data collection consultation.

At the time of data collection secukinumab was approved only for the treatment of AS but has since been approved for use in nr-axSpA. All data will be reported for axSpA patients overall, as well as AS and nr-axSpA separately where appropriate.

Demographic and clinical characteristics

Collected demographic information was derived from physician-reported questionnaires and included a range of parameters such as age, gender, BMI, ethnicity, smoking status, and employment status. Clinical characteristics included the time since onset of symptoms, the time since diagnosis, the number and type of comorbidities, reported disease severity and status (improving, deteriorating, stable), current treatment including the type and number of previous csDMARDs as well as the number and types of biologic therapy.

Treatment effectiveness

Clinical improvement in patients was judged by comparing rheumatologist assessments made at the data collection consultation with those made at treatment initiation, thereby providing a measure of secukinumab's real-world clinical effectiveness. The minimum time of 4 months between treatment initiation and data collection consultation was designed to

incorporate the initial loading phase and 12 weeks of maintenance time, allowing time for the establishment of any treatment effect.

Clinical assessment based on retrospective completion of the questionnaires or medical records included rheumatologist rating for overall severity (mild, moderate, severe), change in disease status (improving, stable, unstable, deteriorating slowly, deteriorating rapidly), physician VAS (0-100 scale, 0 being equivalent to the best possible health assessment and 100 the worst health assessment), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and 44-joint count score [22,23]. Treatment effectiveness analyses were grouped by treatment duration (≥4–<6 months, ≥6–<12months, and ≥12 months).

Patient Reported Outcomes

Patient-reported outcomes (PROs) collected in the current study assessed disease activity (BASDAI) and health-related quality of life (HR-QoL) via use of the EuroQol 5 dimension 5-Level questionnaire (EQ-5D) [24,25] and the Assessment of SpondyloArthritis international Society (ASAS) health index [26], and work productivity or activity impairment via the WPAI questionnaire [27].

PROs were assessed only at the time of consultation; no attempt was made to measure longitudinal outcomes. EQ-5D-5L provided a description of health profile, collected via patient responses on mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Both an EQ-5D index score and visual analogue scale (VAS) score were determined with this instrument. The ASAS HI describes the typical spectrum of problems encountered by axSpA patients in respect to physical, emotional and social functioning [26]. The score ranges from 0 to 17 with a lower score indicating a better and a higher score indicating an inferior health status. A good health state is described with an ASAS HI score ≤ 5. The WPAI questionnaire is a widely validated instrument to measure impairment of work and activities and generates percentages (0–100%) relating to the last week of work undertaken by patients. The instrument quantifies absenteeism (percentage of time missed from work), presenteeism (percentage impairment while at work), overall work impairment (percentage due to absenteeism and presenteeism), and overall activity limitation (percentage limitation in daily activities) with higher values indicating greater limitation.

Rheumatologist satisfaction with secukinumab treatment

For satisfaction with treatment, rheumatologists were asked ‘Which option best describes your satisfaction with the control the current treatment approach is providing for this patient’s axSpA?’ Rheumatologist-reported satisfaction was assessed using a 5-point Likert scale ranging from ‘very dissatisfied’ to ‘very satisfied’. Rheumatologists who answered ‘Very dissatisfied’ or ‘Dissatisfied’ were classed as dissatisfied and rheumatologists who selected the mid-value ‘Neither satisfied nor dissatisfied’ were classed as neutral. Patient treatment satisfaction was assessed in a similar manner.

Statistical methods

This was a point-in-time, non-interventional study. The analysis involved descriptive statistics; where appropriate the proportion of patients, mean values and standard deviation (SD) were reported. Analyses were grouped by the following baseline characteristics: rheumatologist-rated disease severity (mild/moderate/severe) at initiation of secukinumab, severity at the data collection consultation, prior treatment with biologic, treatment duration (≥4–<6 months, ≥6–<12months, ≥12 months), concomitant medication, body mass index (BMI, <25, 25–29.9 and 30+), patient weight (<90 kg, ≥90 kg)., time since diagnosis (<1 year, 1–5 years, >5 years), and time since symptom onset (<1 year, 1–5 years, >5 years). Missing values were not imputed but were removed from all sections of analysis where that variable was used; patients removed from one set of analysis were still eligible for inclusion in other analyses

Ethical considerations

The observational nature of the study does not result in patients being placed at risk and all patients provided informed consent to participate in the study. Responses from participating rheumatologists and patients were assigned a study number to ensure anonymous data collection.

The research was conducted in accordance with national market research and privacy regulations. This study was designed, conducted and reported in accordance with the Guidelines for Good Pharmacoepidemiology Practices (GPP) of the International Society for Pharmacoepidemiology [28] and the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines [29].

Results

A total of 537 patients receiving secukinumab for more than 4 months were included in the study, 359 and 178 of whom were AS and nr-axSpA patients respectively as diagnosed by the rheumatologist. The mean age of patients was 43.4 (11.4) years, 68.2% were male, and the mean BMI was 25.6 (3.5). Most patients were white/Caucasian (91.8%), 17.9% were current smokers and 75.0% of patients were employed either full or part time (Table 1). While there was no formal comparison between patients with nr-axSpA and AS, the mean age of AS and nr-axSpA patients was 45.4 and 39.4 years, respectively. The percentage of female patients was 24.5% in patients with AS and 46.6% in patients with nr-axSpA.

Clinical characteristics and treatment of axSpA population

The mean (SD) number of comorbidities per patient was 0.8 (1.2). The most frequent comorbidities (>5%) were hypertension (11.8%), hyperlipidaemia (9.1%), anxiety (8.8%), depression (8.6%), and diabetes (5.6%).

The mean time since diagnosis in AS patients was 7.1 years and almost half were diagnosed for more than 5 years. The mean time since diagnosis in nr-axSpA patients was 4.2 years and almost one quarter were diagnosed for more than 5 years. Disease manifestations at the data collection consultation included inflammatory back pain/spinal pain (32.2%), stiffness in the morning for longer than 30 minutes (23.6%), and spinal fusion (14.5%) (Table 3).

Treatments taken at the time of data collection in axSpA patients included NSAIDs (23.3%), COX-2 inhibitors (18.4%), and csDMARDs (15.5%) while prescription of non-opioid analgesic, opioid analgesic and oral steroids was below 6% (Table 2). All patients in the analysis were receiving secukinumab for at least 4 months, 55.3% of whom were receiving secukinumab as their first biologic therapy. Secukinumab was the first-line therapy for 53.5% and 58.9% of the AS and nr-axSpA patients, respectively. Of the 537 patients, 453 (84.4%) started secukinumab therapy at the dose of 150 mg, a further 68 (12.7%) started on a dose of 300 mg while increases in the dose occurred in less than 5% of patients. The mean duration for secukinumab therapy was 10.3 (5.8) months (Table 2).

Overall, the mean number of lines of biologic therapy was 1.7 (0.9, median 1.0), 28.7% of whom had received two prior lines of biologics, while 16.0% had received 3 or more biologics. Patients had received an average of 1.4 (0.6) csDMARDs prior to biologic therapy with little variation between patients diagnosed with AS or nr-axSpA.

Real-world effectiveness of secukinumab

At initiation of secukinumab, 9 (1.7%) patients were reported as having mild disease while at the data collection consultation this proportion increased to 70.5% based on the rheumatologist-reported disease severity; only 10 (1.9%) patients had severe disease (Figure 1). Biologic-naïve

patients were more likely to be mild at the time of data collection compared with biologic-experienced patients (74.7% vs. 65.4%).

At the initiation of treatment 35 (6.5%) patients had stable disease while only 4 patients (<1%) were improving based on the rheumatologist assessment of disease status. Following secukinumab treatment, 306 (57.2%) were assessed to be stable and 209 (38.9%) patients were improving; 129 (43.4%) biologic-naïve patients and 80 (33.3%) biologic-experienced patients.

At initiation of secukinumab, the mean (SD) levels of pain were 7.1 (1.4) and reduced dramatically with treatment to 3.0 (1.7) (Figure 2) at the time of data collection. This pattern was similar for global VAS scores reported by both patient and rheumatologist and for the BASDAI and 44-joint count score. Mean (SD) rheumatologist and patient global VAS scores at treatment initiation were 56.9 (22.9) and 64.4 (26.2) respectively. Both scores showed improvements with secukinumab treatment with mean values of 23.0 (19.6) and 25.5 (20.6) respectively at the data collection consultation and the trend was consistent irrespective of prior biologic-experience.

The BASDAI mean (SD) scores at initiation of treatment and at the data collection consultation were 6.2 (1.7) and 2.8 (1.7) while the percentage of patients with BASDAI scores of less than 4 increase from 6.8% at the initiation of treatment to 69.5% at the data collection consultation. The 44 joint score changed from a mean 9.7 (12.1) at the start of treatment to 6.6 (11.2) at the time of data collection.

Assessment of key clinical outcomes according to duration of secukinumab treatment

Assessment of rheumatologist-reported disease severity and status with duration of secukinumab treatment showed that the proportion of patients with mild severity increased from 60.5% after ≥4–<6 months treatment to around 72.7 and 71.8% at longer durations of ≥6–<12 months and ≥12 months. Similarly, the percentage of patients with stable disease assessed by rheumatologists increased from 48.1% with a duration of therapy of ≥4–<6 months to around 49.6% in patients treated for ≥6–<12 months and 70.8% with ≥12 months of secukinumab.

Rheumatologist-assessed global VAS scores showed mean values of 26.6 (22.1), 21.3 (18.4) and 23.9 (20.2) with durations of secukinumab therapy of ≥4–<6 months, ≥6–<12 months and ≥12 months respectively. Corresponding patient-reported global VAS scores were 25.9 (18.9), 25.4 (19.2), and 25.8 (22.5). BASDAI scores had mean values of 3.0 (1.6), 2.8 (1.6) and 2.7 (1.9) with durations of secukinumab therapy of ≥4–<6 months, ≥6–<12 months and ≥12 months respectively. Mean values for 44-joint count scores were 10.0 (12.8), 5.3 (9.6), and 6.7 (11.8).

Patient reported outcomes and the duration of secukinumab therapy

In this study 230 of 537 patients with axSpA provided an assessment of health status via the EQ-5D utility score. The mean value was 0.82 (0.17) and remained consistent in patients with differing durations of treatment and prior biologic experience.

Global functioning was assessed using the ASAS health index and was available for 229 patients. Values ranged from 7.2 (5.1) in patients treated for ≥4–<6 months, to 4.7 (4.3) and 5.4 (4.3) in patients treated for ≥6–<12 months and ≥12 months respectively.

The reported percentage of overall work impairment due to AxSpA was available for 130 patients and showed a mean value of 25.9% (20.9). Patients who had received secukinumab for different durations were compared, and work impairment was found to be 37.2 (19.9), 26.2 (21.3) and 21.7 (19.6) in patients treated with secukinumab for ≥4–<6 months, ≥6–<12 months and ≥12 months respectively. The greatest contribution came from impairment while working where the mean value was 24.9 (19.9). Mean values for impairment while working according to duration of treatment ranged from 34.2 (19.1), 25.2 (20.6) and 21.1 (18.6) in patients treated with secukinumab for ≥4–<6 months, ≥6–<12 months and ≥12 months respectively. Levels of impairment causing absenteeism had a mean value of 3.7 (16.0). The mean value ranged from 2.5 in patients treated with secukinumab for ≥4–<6 months, to 5.2 and 2.8 in patients treated for ≥6–<12 months and ≥12 months respectively. The WPAI activity impairment domain was available for 225 patients with a mean value of 35.0 (19.8) in patients treated for ≥4–<6 months, 28.3 (21.0) for patients receiving secukinumab for ≥6–<12 months and 28.8 (21.1) at ≥12 months respectively.

Rheumatologist and patient treatment satisfaction

Rheumatologist satisfaction with treatment was high with 91.2% (51.8% satisfied and 39.5% very satisfied) of rheumatologists reporting satisfaction for 92.2% and 89.3% of the AS and nr-axSpA patients, respectively. The level of rheumatologist satisfaction was higher for biologic-naïve patients (93.6% satisfied) than for biologic-experienced patients (88.3% satisfied). The level of rheumatologist dissatisfaction with treatment was low for 1.7% of the patients treated with secukinumab (Figure 3). Satisfaction was reported for the 80.2% of the patients while 4.3% reported dissatisfaction; this data was available for 232 patients.

Discussion

This study investigated the real-world effectiveness of secukinumab in AS and nr-axSpA patients treated in routine clinical settings across five European countries. Consistent benefits across multiple clinical and patient reported outcomes were observed. Around 96% of patients were considered by the treating rheumatologists to be stable or improving after treatment with

secukinumab and only ~7% of patients had stable or improving disease at the initiation of treatment. Alongside disease activity, secukinumab improved 44-joint count scores during the period from the treatment initiation to the time of data collection confirming in the real-world the results from randomized clinical trials and long-term studies in AS and axSpA patients [19,14,18,15-17].

Assessment of rheumatologist-reported disease severity indicates continued efficacy with the duration of secukinumab treatment. The proportion of patients with mild severity increased from 60.5% after ≥4–<6 months treatment to around 72% at periods of 6 months or longer. This was also reflected in the percentage of patients with stable disease, increasing from 48% with ≥4–<6 months of secukinumab treatment to over 70% in patients treated for ≥12 months. Benefits associated with the duration of treatment were not confined to disease severity, disease status or joint count scores but were also reflected in mean global VAS scores and BASDAI scores. The reported reduction in disease status scores with secukinumab treatment seen in the current study were consistent with the observed high level of patient satisfaction. Likewise, association of BASDAI with health-related QoL has been noted in AS patients [30,31]. Across multiple clinical and patient-reported outcomes, secukinumab was associated with a treatment benefit after 4 months that was sustained for periods of 12 months or more. Without a formal comparison the results obtained here were also consistent for AS and nr-axSpA patients, and for previously biologic-naive and biologic-experienced patients and provided real-world evidence of secukinumab effectiveness in Europe which has previously been limited.

There are limited data on real-world clinical experience using secukinumab in patients normally encountered in routine settings. In the AQUILA study, an ongoing, multicentre, 52-week non-interventional study enrolling 2000 patients in Germany with active AS and psoriatic arthritis, secukinumab reduced disease activity and improved quality of life for up to one year, as assessed by physician- and patient-reported outcomes [32]. The results mirror those seen here. Furthermore, in a preliminary study of secukinumab treatment in over 1500 patients with axSpA treated in real-world settings in 12 European countries, high retention rates at 6 and 12 months were observed. Retention rates were significantly higher in patients naïve to biologic therapy while lower levels of disease activity were seen in patients who had previously received advanced therapy [33].

Most rheumatologists reported high levels of satisfaction with secukinumab treatment for their patients. Physician-reported satisfaction is usually associated with efficacy and safety benefits to patients and less often focused on QoL benefits. In contrast patient satisfaction with treatment may focus on QoL and has an impact on most outcomes including PROs across many disease areas [34,35]. In the UK, one recent survey of axSpA patients suggested that around 60% of responding patients were either ‘satisfied or very satisfied’ with their medications [36]. This value is below that reported in the current study where patient satisfaction was around

80% although patients in this study had a shorter time since diagnosis (7.1 vs 8.5 years). High levels of patient satisfaction with secukinumab have been reported in a web-based survey of US patients treated in routine settings. Levels of satisfaction were high at over 90% in AS patients treated with secukinumab compared with their previous treatment [37]. In Europe, a survey of 592 patients with rheumatic disease (23.8% had axSpA) reported that normalization of QoL and relief of symptoms were most important and contributed to high satisfaction with current anti-rheumatic therapy (80% were 'satisfied' or 'very satisfied') despite the moderate to severe impact of disease [38].

Limitations

The DSP is not based on a true random sample of physicians or patients and minimal inclusion criteria governed the selection of the participating physicians and participation is influenced by willingness to complete the survey. One of the study limitations is potential selection bias, where patients who consult more frequently are more likely to be included in the study. Furthermore, patients who did not respond or who were intolerant to secukinumab may have been excluded, as patients were only included if they had received treatment for more than 4 months. No formal inclusion criteria were applied, there was lack of source data verification and selection of clinical assessments is lacking proper justification. As this was a point-in-time, non-interventional study, all analyses were descriptive and confounding factors were not taken into consideration.

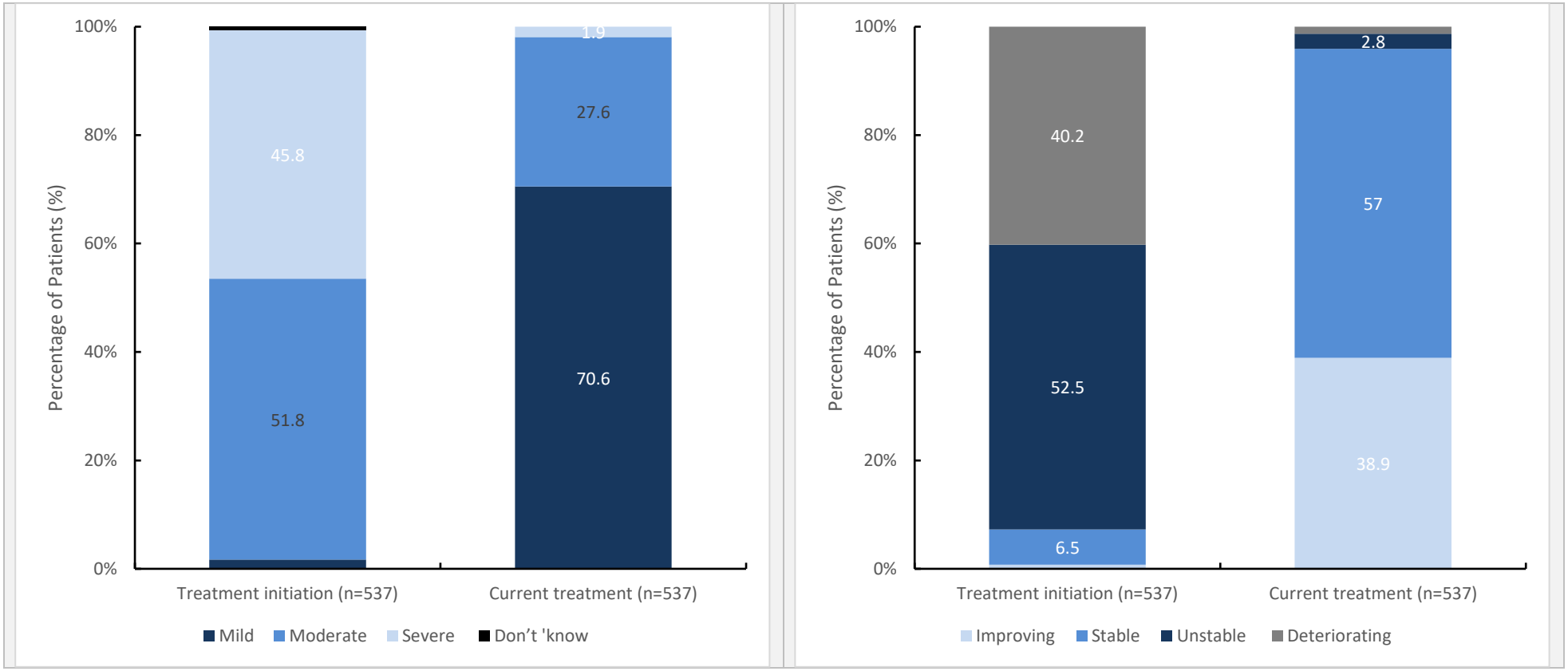
These limitations should be balanced by methodological strengths, which include recruitment of a large, representative sample of patients with axSpA across multiple European countries, using standardized data collection tools and an established methodology. Real-world studies complement the results of randomized clinical trials by avoiding restrictive eligibility criteria and including a wider range of patients often with associated comorbidities and a higher likelihood of sub-optimal adherence.

Conclusions

Treatment effectiveness was shown across clinical and patient-reported outcomes in axSpA patients treated with secukinumab in routine clinical settings across five European countries. Clinical and patient reported benefits associated with secukinumab treatment were sustained for greater than 12 months and were accompanied by high levels of physician and patient satisfaction with treatment.

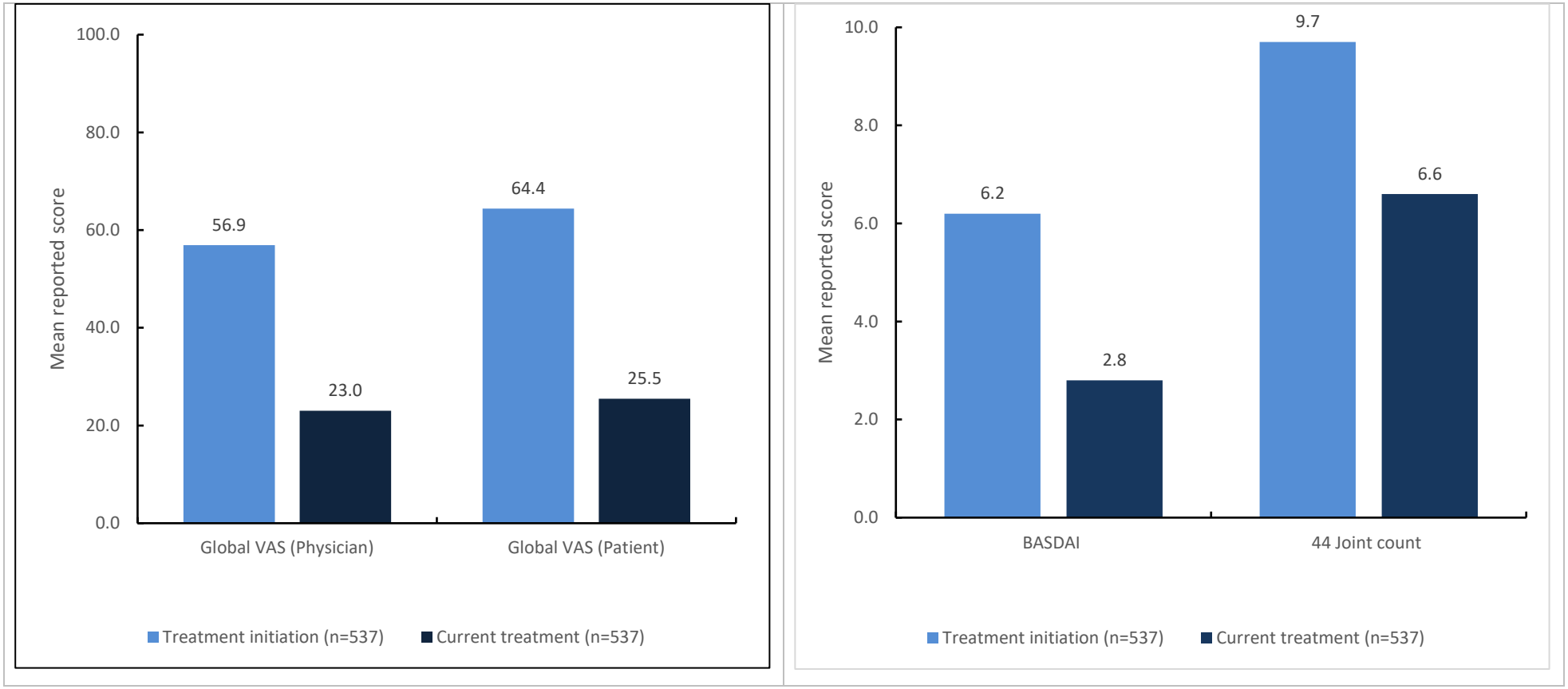
Figures

Figure 1. Rheumatologist reported disease severity and status at secukinumab initiation and data collection consultation



All patients had received secukinumab for at least 4 months and the mean duration of secukinumab therapy 10.3 months

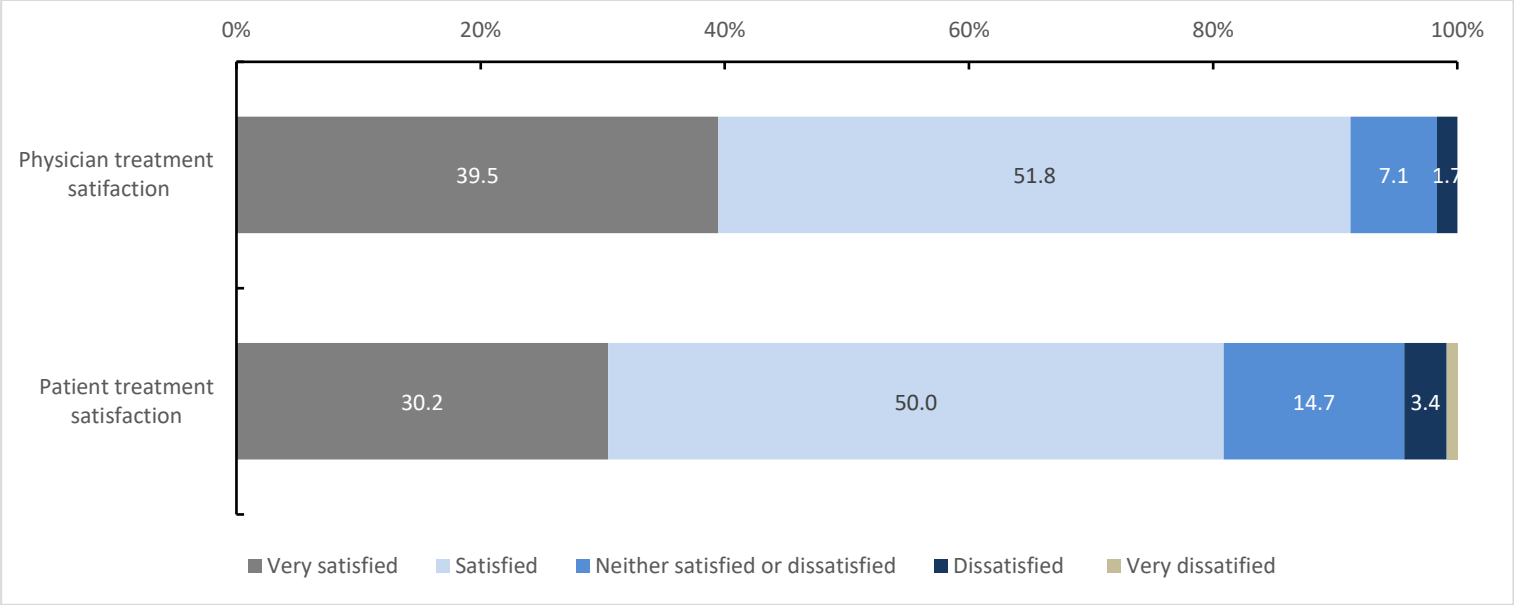
Figure 2. Change in global VAS score (rheumatologist and patient), BASDAI score and 44 joint count score from secukinumab initiation to data collection consultation in the axSpA study population



Values reported for clinical outcomes refer to the total axSpA population of 537 patients

BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; VAS, visual analogue scale

Figure 3. Rheumatologist- and patient-reported treatment satisfaction in patients with axSpA



Tables

Table 1. Demographics of patients included in study

	axSpA patients (n=537)	AS (n=359)	nr-axSpA (n=178)
Age, Mean (SD)	43.4 (11.4)	45.4 (11.0)	39.4 (11.1)
Gender, male n (%)	366 (68.2)	271 (75.5)	95 (53.4)
BMI, Mean (SD)	25.6 (3.5)	25.7 (3.5)	25.3 (3.7)
Ethnicity, n (%)			
White/Caucasian	493 (91.8)	332 (92.5)	161 (90.4)
Asian-Indian subcontinent	12 (2.2)	8 (2.2)	4 (2.2)
Hispanic/Latino	6 (1.1)	4 (1.1)	2 (1.1)
Middle Eastern	7 (1.3)	5 (1.4)	2 (1.1)
Other*	19 (3.5)	10 (2.8)	9 (5.1)
Smoking status, n (%)			
Current smoker	96 (17.9)	67 (18.7)	29 (16.3)
Ex-smoker	154 (28.7)	108 (30.1)	46 (25.8)
Never smoked	233 (43.4)	148 (41.2)	85 (47.8)
Don't know	54 (10.1)	36 (10.0)	18 (10.1)
Employment status, n (%)			
Working full time	341 (63.5)	239 (66.6)	102 (57.3)
Working part time	62 (11.5)	38 (10.6)	24 (13.5)
On long time sick leave	15 (2.8)	12 (3.3)	3 (1.7)
Homemaker	23 (4.3)	13 (3.6)	10 (5.6)
Student	18 (3.4)	6 (1.7)	12 (6.7)
Retired	33 (6.1)	30 (8.4)	3 (1.7)
Unemployed	23 (4.3)	10 (2.8)	13 (7.3)
Don't know	22 (4.1)	11 (3.1)	11 (6.2)

*Other included ethnicities present in less than 1% of the study population and included individuals identifying as other Asian groups, Chinese, Afro-Caribbean, African and Mixed race.
AS, ankylosing spondylitis or radiographic axSpA; axSpA, axial spondyloarthritis; BMI, body mass index; nr-axSpA, non-radiographic axSpA; SD, standard deviation

Table 2. Selected clinical characteristics of axSpA patients

Clinical characteristics	axSpA (n=537)	AS (n=359)	nr-axSpA (n=178)
Time since onset of symptoms, n	349	237	112
Mean (SD), years	8.7 (7.7)	9.5 (8.2)	6.9 (5.9)
Time since diagnosis, n	469	314	155
Mean (SD), years	6.1 (5.7)	7.1 (6.3)	4.2 (3.9)
Symptoms present at data collection consultation, n (%)			
Inflammatory back pain or spinal pain	173 (32.2)	118 (32.9)	55 (30.9)
Sacroiliitis identified by X-ray	161 (30.0)	150 (41.8)	11 (6.2)
Morning stiffness for more than 30 minutes	127 (23.6)	87 (24.2)	40 (22.5)
Sacroiliitis identified by MRI	118 (22.0)	60 (16.7)	58 (32.6)
Spinal fusion	78 (14.5)	73 (20.3)	5 (2.8)
Joint inflammation or stiffness (other than spine) i.e. peripheral joint involvement	62 (11.5)	46 (12.8)	16 (9.0)
Concomitant treatments at time of data collection, n (%)			
NSAID	125 (23.3)	91 (25.3)	34 (19.1)
COX-2 inhibitor	99 (18.4)	71 (19.8)	28 (15.7)
Conventional synthetic DMARD	83 (15.5)	55 (15.3)	28 (15.7)
Non-opioid analgesic	33 (6.1)	26 (7.2)	7 (3.9)
Opioid analgesic	21 (3.9)	14 (3.9)	7 (3.9)
Oral steroid	7 (1.3)	5 (1.4)	2 (1.1)
Number of csDMARDs before biologic therapy,* n	164	116	48
Mean (SD)	1.4 (0.6)	1.4 (0.6)	1.4 (0.7)
Number of lines of biologic therapy received by patient, n	537	359	178
Mean (SD)	1.7 (0.9)	1.7 (0.9)	1.6 (0.9)
Duration of secukinumab therapy in months, mean (SD)	10.3 (5.8)	10.6 (6.4)	9.5 (4.4)
Secukinumab therapy line, n (%)			
1st	297 (55.3)	192 (53.5)	105 (58.9)
2nd	154 (28.7)	108 (30.1)	46 (25.8)
3rd	62 (11.5)	42 (11.7)	20 (11.2)
4th	19 (3.5)	14 (3.9)	5 (2.8)
5th	3 (0.6)	1 (0.3)	2 (1.1)
6th	2 (0.4)	2 (0.6)	-

*This would include one or more of the following csDMARDs: methotrexate, sulfasalazine, leflunomide, cyclosporine, azathioprine etc.)

AS, ankylosing spondylitis or radiographic axSpA; axSpA, axial spondyloarthritis; nr-axSpA, non-radiographic axSpA; COX-2, cyclo-oxygenase 2 inhibitor; csDMARDS, conventional synthetic disease modifying anti-rheumatic drugs; MRI, magnetic resonance imaging; NSAID, non-steroidal anti-inflammatory drug; SD, standard deviation

Table 3. Disease manifestations shown by patients with axSpA, AS and nr-axSpA making up the study population

Disease manifestations present at data collection consultation, n (%)	axSpA (n=537)	AS (n=359)	nr-axSpA (n=178)
Inflammatory back pain (IBP) or spinal pain	173 (32.2)	118 (32.9)	55 (30.9)
Sacroiliitis identified by X-ray	161 (30.0)	150 (41.8)	11 (6.2)
Morning stiffness for more than 30 minutes	127 (23.6)	87 (24.2)	40 (22.5)
Sacroiliitis identified by MRI	118 (22.0)	60 (16.7)	58 (32.6)
Spinal fusion	78 (14.5)	73 (20.3)	5 (2.8)
HLA-B27 positive	68 (12.7)	52 (14.5)	17 (9.6)
Joint inflammation or stiffness (other than spine) i.e. peripheral joint involvement	62 (11.5)	46 (12.8)	16 (9.0)
Back pain for more than 3 months	59 (11.0)	37 (10.3)	22 (12.4)
Enthesitis	45 (8.4)	31 (8.7)	14 (7.9)
Alternating buttock pain	35 (6.5)	25 (7.0)	10 (5.6)
Arthritis	15 (2.8)	9 (2.5)	6 (3.4)
Osteoporosis of the spine	10 (1.9)	6 (1.7)	4 (2.2)
Synovitis	9 (1.7)	6 (1.7)	3 (1.7)
Back pain for 1–3 months	8 (1.5)	5 (1.4)	3 (1.7)
IBP that was previously incorrectly diagnosed as back pain	8 (1.5)	8 (2.2)	0 (0)
Dactylitis	5 (0.9)	3 (0.8)	2 (1.1)
Tendonitis	2 (0.4)	1 (0.3)	1 (0.6)
None of the above	136 (25.3)	79 (22.0)	57 (32.0)

AS, ankylosing spondylitis; axSpA, axial spondyloarthritis; HLA, human leukocyte antigen; IBP, inflammatory back pain; MRI, magnetic; resonance imaging; nr-axSpA, non-radiographic axial spondyloarthritis

Declarations

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Conflicts of interest/Competing interests

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Contributions

All authors had full access to the data in this study and take complete responsibility for the integrity of the data and accuracy of the data analysis. All authors were involved in 1) conception or design, or analysis and interpretation of data; 2) drafting and revising the article; 3) providing intellectual content of critical importance to the work described; and 4) final approval of the version to be published, and therefore meet the criteria for authorship in accordance with the International Committee of Medical Journal Editors (ICMJE) guidelines. In addition, all named authors take responsibility for the integrity of the work as a whole and have given their approval for this version to be published.

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Availability of data and material

The data that support the findings of this study are available from Adelphi Real World, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of Adelphi Real World.

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