PREDICTORS OF REMISSION IN PEOPLE WITH AXIAL SPONDYLOARTHRITIS: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Background. Achievement of remission is a desirable outcome and the identification of predictors of remission may aid in the clinical management of axial spondyloarthritis (axSpA). Our aim was to summarise predictors of remission in people with axSpA.

Methods. In this systematic literature review (SLR), we searched MEDLINE, EMBASE, and Cochrane CENTRAL from their inception to May 20, 2022, and 2020-2021 American College of Rheumatology (ACR) and European Alliance of Associations for Rheumatology (EULAR) meeting abstracts. We included randomized controlled trials and cohort studies in which prognostic factors associated with remission were investigated by multivariable analysis.

Results. The SLR comprised 21 articles from 4592 citations. Three studies investigated "sustained remission" (≥3 consecutive visits), while the other assessed "point remission" (at single points in time, varying from 12 weeks to 8 years). The most used remission criteria were Ankylosing Spondylitis Disease Activity Score (ASDAS) inactive disease (14 studies) and Assessment of SpondyloArthritis international Society partial remission criteria (11 studies). Younger age, HLA-B27 positivity, male gender, lower baseline Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), lower baseline Bath Ankylosing Spondylitis Functional Index (BASFI), lower baseline ASDAS-C-reactive protein, treatment with tumour necrosis factor inhibitors (TNFi), and concomitant use of conventional synthetic disease-modifying anti-rheumatic drugs (csDMARDs), were the most consistent predictors of remission. Additionally, shorter disease duration, lower Health Assessment Questionnaire for the spondyloarthropathies and TNFi naivety were predictors of remission in two studies. Other factors were found to be predictors of remission in one study only.

Conclusions. Predictors of remission in axSpA were identified. However, many of these predictors were only identified in 1-2 studies**.** Considering the differences in study design, further well-designed prognostic studies are needed to confirm and allow generalisation of these predictors to the general axSpA population.

Key messages

- This is the first study systematically summarising predictors of remission in people with axSpA.
- Younger age, HLA-B27 positivity, male gender, lower baseline BASDAI, lower baseline BASFI, lower baseline ASDAS-CRP, treatment with TNFi, and concomitant use of csDMARDs, were the most consistent predictors of remission.
- Considering the observed heterogeneity of predictors and differences in study design, further well-designed prognostic studies are needed to confirm and allow generalisation of these predictors to the general axSpA population.

INTRODUCTION

The primary goal of treating patients with axial spondyloarthritis (axSpA) is to maximise long term health-related quality of life through control of symptoms and inflammation, prevention of progressive structural damage, and preservation or normalisation of function and social participation (1). With the increasing use of biological agents in the treatment of axSpA in recent years, aiming for clinical remission is now a major treatment goal as outlined in current treat-to-target recommendations (2). However, at present, there is no clear, universally accepted definition of remission in axSpA (3-7).

Two main definitions of clinical remission/inactive disease have been proposed: 1) Assessment in Spondyloarthritis International Society (ASAS) partial remission (PR) (8), defined by a value no greater than 20 on a 0-100 scale in four domains: pain represented by the visual analogue scale (VAS) score (0–100); function represented by the Bath Ankylosing Spondylitis Functional Index (BASFI) score (0–100); inflammation represented either by the mean of the two morning stiffness-related Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) questions (item 5 or 6), (8); and 2) Ankylosing Spondylitis Disease Activity Score (ASDAS) inactive disease (ID), defined by an ASDAS score<1.3 (9), with ASDAS C-reactive protein (CRP) or ASDAS erythrocyte sedimentation rate (ESR) being calculated using a formula that weights five items: back pain (BASDAI question 2), peripheral joint complaints (BASDAI question 3), duration of morning stiffness (BASDAI question 6), patient global assessment, and CRP (ASDAS-CRP) or ESR level (ASDAS-ESR) (10-12).

Achievement of remission has been associated with retardation of progression of structural damage (13-15) and better health outcomes, namely improved physical function, health-related quality of life and work productivity (16, 17). Therefore, remission is a desirable outcome in axSpA, and the identification of predictors of remission may further aid in the clinical management of the disease, offering the possibility of more individualised treatment plans and allowing health care professionals to better communicate with patients regarding the course and prognosis of their condition.

This systematic literature review (SLR) aimed to identify predictors of remission in people with axSpA. This is the first SLR performed about this topic.

METHODS

Protocol and search strategy

The SLR protocol and data extraction forms were designed in accordance with the Cochrane Handbook (18) and reported according to the "Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA)" statement (19). The protocol was written and defined before starting the search. The only deviation from the protocol was to conduct an updated search during the review process of the manuscript to capture any articles published more recently and not included in the first version of the manuscript.

The literature search was performed in MEDLINE, EMBASE and the Cochrane Central Register of Controlled Trials (CENTRAL) for articles published up to 20 of May 2022, without language restriction. American College of Rheumatology (ACR) and European Alliance of Associations for Rheumatology (EULAR) meeting abstracts from the last 2 years (2020-2021) were searched and only included if they had not already been published as original studies and if they offered relevant data on predictors of remission with sufficient data on the methodology to allow quality appraisal. Reference lists of all relevant studies retrieved from the electronic search were manually searched to identify additional potentially eligible studies.

The "Population, Intervention, Control and Outcome" (PICO) framework was used for the development of the search strategy. The population was defined as "adults (≥18 years) diagnosed with axSpA (non-radiographic axSpA or radiographic axSpA/Ankylosing Spondylitis [AS])"; the intervention was defined as "treatment with nonsteroidal anti-inflammatory drugs (NSAID) or with conventional synthetic (cs)/target synthetic (ts)/biological (b) disease-modifying antirheumatic drugs (DMARD)"; there was no comparator; the outcomes were defined as "achievement of a remission(-like) state according to any definition".

To identify the relevant studies, medical subject headings and keywords related to "axial spondyloarthritis", "remission," and "prognostic study" were used. All the subject headings under each of these headings were combined with "*OR*". Subsequently, the set of articles related to "axial spondyloarthritis" were combined with the other two sets of articles pertaining to "remission" and "prognostic study" using the combination term "*AND*". The search strategy used to identify relevant studies is given in Supplementary Table 1.

The following study designs were allowed: observational prospective and retrospective cohort studies, randomised controlled trials and single-arm clinical trials.

EndNote 20 was used to manage the references obtained from the search results of each of the databases.

Study selection

Two reviewers (A.S.P. and B.F.) screened the titles and abstracts of the retrieved articles applying pre-defined inclusion criteria: 1) patients diagnosed with axSpA by a physician, meeting or not pre-specified classification criteria (e.g. modified New York criteria, ASAS criteria); 2) age ≥18 years; 3) patient received any pharmacological treatment, including NSAIDs or cs/ts/b-DMARDs; 4) the study assessed predictive or prognostic factors of remission, according to any remission definition; and 5) the statistical analysis included multivariable analysis, such as multivariable logistic regression or Cox proportional hazards models, to allow the identification of independent predictors of remission.

Studies were excluded from this review if they met the following criteria: 1) study population other than axSpA; 2) not possible to gather the data required to assess whether patients met the above inclusion criteria; 3) non-human studies; 4) not original research, such as letters to the editor, commentaries, editorials and review articles; 5) cross-sectional studies in which it is not possible to evaluate prognostic factors; and 6) less than 20 patients achieving the outcome remission and therefore, jeopardizing the validity of multivariable analysis (Supplementary table 2) .

Data extraction and quality assessment

Two independent reviewers evaluated potentially relevant articles in full text, collected the data and assessed the quality of the studies, under the guidance of the methodologist (P.M.M.). Data were extracted systematically in accordance with the objectives of the study using an Excel-based data collection form designed for this purpose. Data extracted from every study included: author(s), country(ies) of origin of the data, year of publication, study design, follow-up duration, type of axSpA, fulfilment of classification criteria, total number of patients, treatment received, remission criteria used, sociodemographic and clinical characteristics, disease activity and functional indices, proportion of patients in remission at the end of follow-up, predictors of remission studied, time point(s) of assessment of remission, and the statistical analysis performed.

The methodological quality of the included studies was assessed using the *Quality* of *Prognosis Studies* in Systematic Reviews (QUIPS) tool (20). The QUIPS tool uses six important domains (study participation, study attrition, prognostic factor measurement, outcome measurement, study confounding and statistical analysis and reporting) that should be critically

appraised when evaluating validity and bias in studies of prognostic factors (Supplementary Table 3). Any discrepancies were discussed until a consensus was reached between the two primary assessors, or with the involvement of a third reviewer (P.M.M.), whenever necessary.

Data synthesis

Data was summarised by stratifying predictors into 4 groups: *socio-demographic factors, comorbidities and axSpA subtype; laboratory and imaging factors; c*linical scores and evaluations; treatments. The association between predictor variables and the outcome remission was expressed by Odds Ratio (OR) or Hazard Ratio (HR), as appropriate.

RESULTS

Our search retrieved 4592 articles. From these, we excluded 894 duplicates within and across databases. After review of the title and abstract, 34 articles were retrieved for full-text evaluation, of which we included 21 articles (18 from electronic databases and 3 from hand search), as shown in Figure 1. The articles excluded and the reasons for exclusion are shown in Supplementary Table 3.

The study characteristics are described in Table 1 and the methodological quality assessment is provided in Table 2. Nine studies included data from randomized controlled trials (RCT): one from RHAPSODY (21), two from ATLAS (22, 23), one from INFAST (24), two from ABILITY-3 (25, 26), one from SELECT-AXIS-1 (27), and two articles that included more than one trial as part of their study population (28, 29). The remaining twelve studies were observational studies, seven of them retrospective, and five prospective.

Remission criteria varied between studies, with ASAS-PR (11 studies) and ASDAS-ID (14 studies) being the most used. However, other non-validated definitions were also used, such as BASDAI<4.0, BASDAI<1.0, BASDAI<2.0 plus CRP within normal values (± without peripheral joint disease). In 20 studies, subjects were treated with bDMARDs with or without concomitant csDMARD or NSAID treatment, while in one study patients were treated with upadacitinib, a Janus kinase inhibitor (JAKi). Study duration ranged from 12 weeks to 8 years.

The characteristics of patients in included studies are shown in Table 3. In some studies, subgroups of patients were investigated, and the overall features were not reported. In those cases, details of the subgroups are presented.

Independent predictors of remission

Table 4 (organised by study) and supplementary table 4 (organised by predictor) summarise the positive and negative predictors of remission and the variables adjusted for in the multivariable models. Remission rates varied between studies, depending on the remission criteria used, time-point of remission assessment, and subgroups of patients studied. Three studies investigated “sustained remission” (remission at least in 3 consecutive follow-up visits) (23, 25, 30), while the other studies assessed “point remission” (remission at single points in time; varying from 12 weeks to 5 years).

Socio-demographic factors, comorbidities and axSpA subtype

Age and age of diagnosis: Seventeen studies included age in the multivariable analysis. Age showed to be a predictor of remission in ten of these studies and all of them concluded that younger patients were more likely to reach remission when compared to older patients (21, 22, 24, 26, 28-33). One study dichotomised age of diagnosis (≤40 vs >40 years), two studies included dichotomised and continuous analysis of age, while the others assessed age as a continuous variable. However, in some studies younger age was not found to be a predictor of remission (23, 25, 34-38).

Gender: In 4 out of 13 studies, male gender was identified as a predictor of remission, evaluated at a single time-point in 3 studies (26, 34, 39) and as a predictor of sustained remission in one study (30). Other studies evaluated gender as a potential remission factor but did not find it to be a predictor of remission (22-25, 32, 35-38).

Disease duration: Two studies concluded that shorter disease duration was a predictor of remission (28, 40). In the study by Ruyssen-Witrand et al (40), shorter symptom duration was a predictor of 5-year drug-free remission. Disease duration was evaluated in other studies without being identified as a predictor of remission (22, 23, 25, 26, 32, 34, 35, 37, 38).

Higher education level: One study (36) assessed predictors of 5-year remission among patients exposed to TNFi, and found that higher educational level was a significant independent predictor.

Body mass index (BMI): Pina Vegas et al (36) found that a lower BMI was a prognostic factor associated with remission.

Modified Rheumatic Disease Comorbidity Index (mRDCI): One study (37) assessed the impact of baseline mRDCI, a simple comorbidity count, in a mixed axial and peripheral SpA population, and mRDCI was the only negative predictor of ASDAS-ID.

Fibromyalgia: Molto et al (41) showed that axSpA patients with concomitant fibromyalgia were less likely to achieve remission.

Laboratory and imaging factors

HLA-B27: HLA-B27 positivity was a predictor of remission in six studies (21, 24, 26, 28-30). However, HLA-B27 was not a significant predictor of remission in seven studies (23, 25, 34-36, 38, 40).

CRP: Six studies showed CRP to be a predictor of remission, however with conflicting results. Two studies concluded that a higher CRP level was associated with achievement of remission (21, 29).

Vastesaeger et al (29) showed that high CRP (vs low) was a predictor of ASDAS-ID and ASAS-PR at 6 months, but they did not find a significant difference between moderate and low levels of CRP. In another study (26), a higher high sensitivity (hs)-CRP level at baseline, included in the model as a continuous variable, showed a positive association with achievement of ASAS-PR at week 12, whereas normal hs-CRP was predictive of ASDAS-ID at the final visit. Conversely, two studies (23, 32) showed that an abnormal CRP was negatively associated with remission, one of them, in the ATLAS cohort (23), showing a negative association with sustained ASDAS-ID, but not sustained ASAS-PR. In these studies, abnormal CRP was defined as a categorical variable in the study by Sieper et al (≥0.49 mg/dl vs <0.49 mg/dL) (23) and Glintborg et al (>14 mg/L vs ≤14 mg/L) (32). Finally, Nam et al (31) concluded that normalization of CRP at 3 months was an independent predictor of achievement of BASDAI-CRP remission (BASDAI<2 with normal CRP values) but not ASDAS-ID. Other studies did not find CRP to be an independent predictor of remission (24, 25, 28, 34, 35).

Spondyloarthritis Research Consortium of Canada (SPARCC) Magnetic Resonance Imaging (MRI) sacroiliac (SI) joint and spinal inflammation score: In the ABILITY-3 cohort (26), a higher SPARCC MRI SI joint score was a baseline predictor of remission among patients with active nr-axSpA. However, in the same study, a lower SPARCC MRI spine score at baseline also predicted ASDAS-ID.

Positive MRI of the SI joint: The presence of SI joint inflammation on MRI was a predictor of ASDAS-ID at the final visit in patients with nr-axSpA treated with adalimumab (26).

Clinical scores and evaluations

BASDAI: Four studies (23, 31, 33, 36) evaluated BASDAI as a predictive factor. In two of them, baseline low BASDAI was associated with remission (33, 36). Similarly, in the ATLAS study (23), the mean of BASDAI questions 5 and 6 was negatively associated with ASDAS-ID sustained remission. Nam et al (31) reported that 3-month BASDAI improvement was a predictor of ASDAS-ID and BASDAI-CRP achievement during TNFi treatment.

ASDAS-CRP: In two studies evaluating ASDAS-CRP at baseline, a lower ASDAS-CRP was associated with achievement of ASDAS-ID at week 12 in one (26), and with 5-year drug-free remission in the other (40). In a study by Landewé et al (25), ASDAS-CRP at week 28 was negatively associated with ASDAS-ID at week 68.

BASFI: Lower baseline BASFI was reported to be associated with remission in patients treated with TNFi in five studies (21, 23, 26, 29, 32).

Bath Ankylosing Spondylitis Metrology Index (BASMI): Rudwaleit et al (21) reported that better mobility at baseline, measured by the BASMI, was associated with achievement of ASAS-PR.

Achievement of ASDAS-ID or ASAS-PR at week 12: Sieper et al (23) reported that achievement of ASDAS-ID at week 12 was a predictor of sustained ASDAS-ID remission, while achievement of ASAS-PR at week 12 was a predictor of sustained ASAS-PR remission.

Health Assessment Questionnaire for the spondyloarthropathies (HAQ-S): Two studies (26, 40) showed that HAQ-S was negatively associated with achievement of remission.

Total back pain: In the ABILITY-3 cohort (26), lower baseline total back pain predicted clinical remission at the final visit but not at week 12. Magrey et al, concluded that an improvement from baseline to week 12 in total back pain was associated with remission at 1 year (27). Total back pain was not a significant predictor of remission in other five studies (21, 23, 25, 26, 31).

Morning stiffness: Sieper et al (26) found that more severe baseline morning stiffness was associated with 12-week ASDAS-ID. However, morning stiffness marginally predicted remission at the final visit in the same study.

History of peripheral arthritis: In the DESIR cohort (36), history of peripheral joint arthritis, among patients never exposed to TNFi, was associated with 5-year remission.

Enthesitis index: Pina Vegas et al (36) reported, among patients exposed to TNFi, that a lower enthesitis index was one of the baseline factors associated with 5-year remission.

Treatments

TNFi: The association of TNFi treatment with remission was evaluated in six studies (21, 22, 24, 28, 29, 34). Rudwaleit et al (21) and Paccou et al (34) reported TNFi naivety as being a significant predictor of remission. Treatment with adalimumab (22), TNFi therapy (vs csDMARDs) (29), infliximab plus naproxen (vs placebo plus naproxen) (24), and etanercept (vs sulfasalazine or placebo) (28) were all associated with remission.

Analgesics / NSAIDs: Conflicting results were reported in two studies (26, 40) addressing the use of analgesics / NSAIDs. In a study by Sieper et al (26), in which patients with active disease were included, the use of concomitant NSAIDs predicted remission defined by ASAS-PR at the last visit. In a prospective longitudinal DESIR cohort study from Ruyssen-Witrand et al (40), that included patients with early axial SpA, irrespective of disease activity, the authors reported that higher NSAIDs score at baseline was negatively associated with drug-free remission at 5 years.

csDMARDs: Use of csDMARDs was evaluated as a predictive factor in three studies (26, 30, 35). Sieper et al (26) reported that the use of concomitant csDMARDs predicted remission defined by ASDAS-ID. Benavent et al (30), concluded that the use of methotrexate was a positive predictor of remission. In the study by Hernandez-Breijo et al (35), use of concomitant csDMARDs with adalimumab or infliximab contributed to achieving BASDAI remission in overweight/obese patients.

Any DMARD: In a study by Ruyssen-Witrand et al (40), the authors concluded that patients that did not start a DMARD during the follow-up period had higher probability to be in drug-free remission at year five.

DISCUSSION

In this SLR, we compile all the available data on predictors of remission in axSpA patients, based on multivariable analyses. We report a total of 28 predictors in four categories: socio-demographic factors; comorbidities and axSpA subtype; laboratory and imaging factors; clinical scores and evaluations; and treatments.

Younger age (10 studies), HLA-B27 positivity (6 studies), lower baseline BASFI (5 studies), treatment with TNFi (4 studies), male gender (4 studies), lower baseline BASDAI (3 studies; one of them looking at the mean of questions 5 and 6), lower baseline ASDAS-CRP and concomitant use of csDMARDs (3 studies), were found to be predictors of remission in at least in three studies. Additionally, shorter disease duration, lower HAQ-S and TNFi naivety were found to be predictors of remission in two studies.

Conflicting data was reported regarding NSAID use. In a study by Ruyssen-Witrand et al (40), in which a significant proportion of patients with early disease were included, the authors reported that a higher NSAIDs score at baseline was negatively associated with drug-free remission at 5 years. In this study, one of the remission criteria was having an ASAS-NSAID score ≤ 25% at 5 years. Therefore, given the study design, it is not surprising that taking less NSAIDs at baseline was associated with drug-free remission at 5 years, as these are likely to be patients with milder disease. However, another study reported a positive association between the use of NSAIDs and remission, in patients with active disease at baseline. Indeed, Sieper et al (26) reported that the use of concomitant NSAIDs predicted remission. This can be explained because NSAIDs have a positive effect on the disease control, as reported in the INFAST study (42), which showed that 35.3% of patients on monotherapy with NSAIDs reached remission. Regarding other treatments (csDMARDs or bDMARDs) the data is more consensual with the use of both groups of medications being predictive of remission, and the use of a first bDMARD showing a higher probability of remission achievement.

Except for CRP (6 studies; discussed below), other predictors were only found to be associated with remission in one study, namely: higher education level, lower body mass index, more intense morning stiffness, lower baseline total back pain, history of peripheral arthritis, mRDCI, absence of concomitant fibromyalgia, higher SPARCC MRI SIJ score, lower SPARCC MRI spinal inflammation score, positive MRI of the SI joint, lower BASMI, lower enthesitis index and not

starting any DMARD during the follow-up period. Therefore, the latter data need to be interpreted with more caution.

Conflicting results were observed for CRP. Two studies concluded that higher CRP levels were associated with remission. However, two studies showed that an abnormal CRP was a negative predictor of remission. Additionally, in the ABILITY-3 study, higher hs-CRP level at baseline showed a positive association with the achievement of ASAS-PR at week 12, while normal hs-CRP was predictive of ASDAS-ID at the final visit. It is known that increased CRP levels are a predictor of response to biologic treatment (43), both in patients with radiographic and non-radiographic axSpA (1). However, "achievement of treatment response" is an easier outcome to achieve compared to "achieving remission"; for example, a change from a BASDAI of 8 to a BASDAI of 5 could deem the patient as being a responder, while still far from achieving a remission/inactive disease status. This highlights the importance of studying remission as a (status) endpoint compared to improvement (change) scores or criteria, which have been more frequently studied. Moreover, different study designs, population characteristics and treatments used, as well as the definition of remission used and time of assessment, may explain discrepant results.

Our study has several limitations. Overall, there was significant heterogeneity in terms of the population included (proportion of radiographic vs. non-radiographic axSpA patients), disease duration (proportion of early vs. late disease patients), and time point of remission assessment, making the data more difficult to interpret. Most studies (n=18) evaluated remission at a single point in time rather than sustained remission (n=3); this can lead to heterogeneity in results and outcomes may not be comparable; furthermore, given that during recent decades, the target of treatment of axSpA has changed towards early and persistent remission, data on sustained remission has become increasingly desirable. Given that axSpA is characterised by fluctuating symptoms, the absence of flares over time should also be considered as part of a definition of remission in future studies. Moreover, several definitions of remission were used, some of them not validated. BASDAI remission was defined in 5 different ways in the included studies since there is no validated BASDAI definition of remission, some of them arguably representing a remission state. ASDAS-ID and ASAS-PR were the most used measures of remission, largely (but not always) with similar results. Remission can be defined as the absence or minimal disease activity and complete abrogation of inflammation, but there is no definite consensus about this definition in axSpA patients. There is no available composite measure that includes extra-musculoskeletal manifestations, such as uveitis, psoriasis and inflammatory bowel disease, although the patient global assessment (included in

ASDAS) could serve as a surrogate. Therefore, a patient with “inactive disease” defined by a certain disease activity instrument but still presenting with uveitis flares is not truly in remission, and future definitions of remission should take these considerations into account. Finally, it is also important to note that some studies had a small sample size, limiting the robustness of the estimates in the multivariable models.

In conclusion, our study summarised 28 predictors of remission in people with axSpA. Younger age, HLA-B27 positivity, male gender, lower baseline BASDAI, lower baseline ASDAS-CRP, lower baseline BASFI, treatment with TNFi and concomitant use of csDMARDs were the most consistent factors predictive of remission. Considering the differences in study design, particularly characteristics of the population studied, duration of remission, and remission criteria used, further well-designed prognostic studies are needed to confirm and allow generalisation of the identified predictors to the general axSpA population. Of note, only three studies assessed sustained remission; axSpA is a disease characterised by fluctuating levels of inflammation and periods of flare, making sustained remission a particularly desirable outcome to investigate in future studies.

Competing interests: P.M.M. has received consulting/speaker's fees from Abbvie, BMS, Celgene, Eli Lilly, Galapagos, Janssen, MSD, Novartis, Orphazyme, Pfizer, Roche and UCB, all unrelated to this manuscript. A.S.P: no conflicts of interest; B.F: no conflicts of interest.

Contributorship: A.S.P and B.F performed the literature search, performed the data extraction and analysis, and wrote the first draft of the manuscript. P.M.M. designed the study, supervised the work, and acted as the methodologist and 3rd reviewer. All the authors contributed to writing the manuscript, read and approved the final manuscript.

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Ethical approval information: None or not applicable.

Data sharing statement: Data sharing not applicable as no datasets generated and/or analysed for this study. All data relevant to the study are included in the article or uploaded as supplementary information.

TABLES

Table 1. Characteristics of included studies

Study reference	Country or trial/cohort	Study design	Study duration	Sample size	Remission criteria	Treatment
Rudwaleit et al, 2009 (21)	RHAPSODY	Data from RCT	20 weeks	1250	ASAS-PR	ADA
Maksymowych et al, 2010 (22)	ATLAS	Data from RCT	24 weeks	315	ASAS-PR	ADA or PBO
Sieper et al, 2012 (23)	ATLAS	Data from RCT	5 years	311	ASAS-PR, ASDAS-ID	ADA
Paccou et al, 2012 (34)	France	Retrospective	NA	189	BASDAI<2; no peripheral joint disease and normal CRP	ADA or IFX or ETA
Baraliakos et al, 2015 (28)	Europe, Latin America, Asia-Pacific, Middle East, North America	Data from 4 RCTs (posthoc analysis of pooled data)	12 weeks	1281	ASAS-PR	ETA or SSZ or PBO
Sieper et al, 2016 (24)	INFAST	Data from RCT	28 weeks	150	ASAS-PR	IFX+NPX or NPX+PBO
Lubrano et al, 2018 (39)	Italy	Retrospective	≥ 12 months	340	ASAS-PR, ASDAS-ID	ADA or IFX or ETA or GOL
Landewé et al, 2018 (25)	ABILITY-3	Data from RCT	40 weeks	305	ASAS-PR, ASDAS-ID	ADA or PBO
Shimabuco et al, 2018 (33)	Brazil	Retrospective	41.5 months (0.5 to 116.1)	117	ASDAS-ID	ADA or IFX or ETA
Yahya et al, 2018 (38)	United Kingdom	Retrospective	6 months	651	BASDAI<1	TNFi
Hernandez-Breijo et al, 2019 (35)	Spain and the Netherlands	Prospective	1 year	180	BASDAI<2 and CRP≤5 mg/L, ASDAS-ID	ADA or IFX
Sieper et al,	ABILITY-3	Data from RCT	28 weeks	673	ASDAS-ID, ASAS-PR	ADA

2019 (26)						
Nam et al, 2021 (31)	Korea	Retrospective	33 months	139	ASDAS-ID, BASDAI<2 with normal CRP level	TNFi
Ruyssen-Witrand et al, 2020 (40)	DESIR cohort	Cohort/ prospective	5 years	708	ASAS-PR and/or ASDAS-ID plus no DMARDs and NSAIDs score ≤25 at the 5-year visit	Any previous NSAIDs, csDMARDs or bDMARDs treatment
Pina Viegas et al, 2021 (36)	DESIR cohort	Prospective	5 years	449	ASDAS-ID	TNFi, NSAIDs, CS, csDMARDs or drug-free
Magrey et al, 2021 (27)	SELECT-AXIS 1	Data from RCT	1 year	187	ASDAS-ID, ASAS-PR	Upadacitinib
Glintbord et al, 2010 (32)	DANBIO	Cohort /prospective	8 years	842	BASDAI<4	ADA or IFX or ETA
Vastesaeger et al, 2011 (29)	ASSERT and GO–RAISE	Post-hoc analysis	24 weeks	635	ASDAS-ID, ASAS-PR	TNFi or placebo+NSAIDs, MTX, SSZ or CS
Benavent et al, 2022 (30)	SpA-Paz cohort	Prospective	2 years	186	ASDASI-ID, BASDAI <2 and normal CRP	TNFi or Interleukine 17 inhibitors
Iannone et al, 2018 (37)	Italy	Retrospective	NA	213	ASDAS-ID	bDMARDs
Molto et al, (41)	65 centres (64 French +1 Algerian centre)	Prospective	12 weeks	527	ASDASS-ID	TNFi

ADA: Adalimumab; ASAS-PR: Assessment in Ankylosing Spondylitis Partial Remission; ASDAS-ID: Ankylosing Spondylitis Disease Activity Score Inactive Disease; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; bDMARDs: Biological disease-modifying antirheumatic drugs; CRP: C-reactive protein; CS: Corticosteroids; csDMARDs: Conventional synthetic disease-modifying antirheumatic drugs; DMARDs: Disease-modifying antirheumatic drugs; ESR: Erythrocyte sedimentation rate; ETA: Etanercept; GOL: Golimumab; IFX: Infliximab; MTX: Methotrexate; NA: Not available; NPX: Naproxen; NSAIDs: Non-steroidal anti-inflammatory drugs; PBO: Placebo; RCT: Randomized Controlled Trial; RAPID3: Routine Assessment of Patient Index Data 3; SSZ: Sulfasalazine; TNFi: Tumour necrosis factor inhibitor.

Table 2. Methodological quality of included studies (risk of bias assessment)

Study reference	Research question clear	Study participation	Study attrition	Prognostic factor measurement	Outcome measurement	Confounding accounted for	Analysis	Overall
Rudwaleit et al, 2009 (21)	Yes							
Maksymowych et al, 2010 (22)	Yes							
Sieper et al, 2012 (23)	Yes							
Paccou et al, 2012 (34)	Yes							
Baraliakos et al, 2015 (28)	Yes							
Sieper et al, 2016 (24)	Yes							
Lubrano et al, 2018 (39)	Yes							
Landewé et al, 2018 (25)	Yes							
Shimabuco et al, 2018 (33)	Yes							
Yahya F et al, 2018 (38)	Yes							
Hernandez-Breijo B et al, 2019 (35)	Yes							
Sieper J et al, 2019 (26)	Yes							
Nam EJ et al, 2021 (31)	Yes							
Ruyssen-Witrand A et al, 2020 (40)	Yes							
Pina Viegas L et al, 2021 (36)	Yes							
Magrey M et al, 2021 (27)	Yes							
Glintbord B et al, 2010 (32)	Yes							
Vastesaeger N et al, 2011 (29)	Yes							
Benavent et al, 2022 (30)	Yes							
Iannone F et al, 2018 (37)	Yes							
Molto et al, 2017 (41)	Yes							

Green: low bias; yellow: moderate bias; red: high bias.

Table 3. Baseline characteristics of the study populations included in the selected articles

Study reference	axSpA type	Age, mean (SD) or median (range), years	Men, %	Disease duration, Mean (SD) or median (range), years	HLA-B27, %	Spinal pain, Mean (SD) or median (range), cm	BASDAI, Mean (SD) or median (range), cm	BASFI, Mean (SD) or median (range), cm	ASDAS, Mean (SD) or median (range)
Rudwaleit et al (21)	AS	44 (11.4)	71.3	11 (9.8)	82.1	6.2 (2.3)	6.3 (1.4)	5.4 (2.2)	-
Maksymowych et al (22)	AS	**PBO:** 43.4 (11.3) **ADA:** 41.7 (11.7)	74.9	10.6	78.7	**PBO:** 6.7 (2.2) **ADA:** 6.4 (2.1)	**PBO:** 6.3 (1.7) **ADA:** 6.3 (1.7)	**PBO:** 5.6 (2.2) **ADA:** 5.2 (2.2)	-
Sieper et al (23)	AS	42.3 (11.6)	74.9	11.0 (9.5)	78.8	6.5 (2.1)	6.3 (1.7)	53.8 (22.1)	-
Paccou et al (34)	AS	45.6 (12.5)	64.0	12.7 (10.0)	77.1	-	-	-	-
Baraliakos et al (28)	AS	**DD ≤2 Yrs:** 36.9 (35.8–38.1) **DD 2-5 Yrs:** 37.9 (36.4–39.4) **DD 5-10 Yrs:** 39.5 (38.1–40.9)	74.7	**DD ≤2 Yrs:** 0.7 (0.6–0.7) **DD 2-5 Yrs:** 3.3 (3.2–3.5) **DD 5-10 Yrs:** 7.3 (7.2–7.5)	81.0	**DD ≤2 Yrs:** 6.0 (5.8–6.1) **DD 2-5 Yrs:** 6.0 (5.7–6.2) **DD 5-10 Yrs:** 5.8 (5.6–6.0)	**DD ≤2 Yrs:** 5.9 (5.7–6.1) **DD 2-5 Yrs:** 6.1 (5.9–6.3) **DD 5-10 Yrs:** 5.8 (5.7–6.0)	**DD ≤2 Yrs:** 5.3 (5.1–5.6) **DD 2-5 Yrs:** 5.5 (5.2–5.8) **DD 5-10 Yrs:** 5.6 (5.3–5.8)	**DD ≤2 Yrs:** 3.6 (3.6–3.7) **DD 2-5 Yrs:** 3.7 (3.6–3.8) **DD 5-10 Yrs:** 3.7 (3.6–3.8)
Sieper et al (24)	AS, nr-axSpA	**AS:** IFX+NPX: 31.2 (8.2) PBO+NPX: 31.0 (7.6) **nr-axSpA:** IFX+NPX: 31.8 (8.9) PBO+NPX: 30.9 (7.3)	72.0	**AS:** IFX+NPX: 2.0 (0.9) PBO+NPX: 1.8 (0.9) **nr-axSpA:** IFX+NPX: 1.4 (0.9) PBO+NPX: 1.5 (0.9)	86.0	-	**AS:** IFX+NPX: 6.5 (1.5) PBO+NPX: 6.4 (1.6) **nr-axSpA:** IFX+NPX: 6.4 (1.6) PBO+NPX: 6.1 (1.4)	-	-
Lubrano et al (39)	AS, nr-axSpA, axial PsA	43.2 (12.7)	69.4	7 (3.0–14.0)	**M:** 65.5 **F:** 55.5	**M:** 7.0 (5.0–7.0) **F:** 7.5 (6.0–9.1)	**M:** 5.7 (4.8–7.4) **F:** 6.1 (5.1–7.5)	**M:** 5.5 (4–7.5) **F:** 5.5 (4.4–7.1)	**M:** 3.7 (2.9–4.1) **F:** 3.4 (2.3–4.0)
Landewé et al (25)	nr-axSpA	35 (10.2)	62.0	7.7	87.0	-	-	-	-

Shimabuco et al (33)	AS	NS: 37.3 (13.2) S: 38.3 (11.2)	84.6	**NS:**11.4 (6.2-17.7) **S:** 9.2 (5.7-19.2)	83.7	-	**NS:** 5.2 (2.0) **S:** 5.5 (2.1)	**NS:** 5.2 (2.5) **S:** 5.9 (2.4)	**NS:** 3.8 (0.9) **S:** 3.9 (1.0)
Yahya et al (38)	AS, nr-axSpA	-	77.0	-	78.0	-	6.8 (1.5)	-	-
Hernandez-Breijo et al (35)	AS, nr-axSpA	47.0 (12.7)	59.0	8 (5.0–16.0)	73.0	-	5.8 (2.0)	-	3.3 (1.0)
Sieper et al (26)	nr-axSpA	**ASDAS-ID:** R 33.7 (9.8) NR 38.9 (11.4) **ASAS-PR:** R 32.0 (8.7) NR 38.5 (11.3)	**ASDAS-ID:** 49.2 **ASAS-PR:**49.5	**ASDAS-ID:** R 6.1 (6.2) NR 8.3 (8.1) **ASAS-PR:** R 5.3 (5.7) NR 8.0 (7.8)	**ASDAS-ID:** 76.2 **ASAS-PR:**76.2	**ASDAS-ID:** R 7.0 (1.7) NR 7.7 (1.5) **ASAS-PR:** R 7.1 (1.8) NR 7.5 (1.6)	**ASDAS-ID:** R 6.6 (1.3) NR 7.1 (1.4) **ASAS-PR:** R 6.6 (1.4) NR 7.0 (1.4)	**ASDAS-ID:** R 4.6 (2.2) NR 5.7 (2.2) **ASAS-PR:** R 4.9 (2.4) NR 5.4 (2.2)	**ASDAS-ID:** R 3.4 (0.8) NR 3.7 (0.8) **ASAS-PR:** R 3.7 (0.9) NR 3.6 (0.8)
Nam et al (31)	AS	37.5 (10.8)	87.8	9.9 (7.3)	93.5	6.5 (1.7)	5.8 (1.2)	4.4 (2.2)	3.7 (0.8)
Ruyssen-Witrand et al (40)	Early axSpA*	33.8 (8.6)	46.2	18.1 (10.4)	57.9	-	-	-	-
Pina Vegas et al (36)	axSpA	34.0 (8.7)	45.9	-	63.2		4.5 (2.0)	2.9 (2.3)	2.6 (0.9)
Magrey et al (27)	AS	45.4 (12.5)	71.0	14.4 (12.5)	71.0	6.0 (4.5–7.6)	6.0 (5–7.2)	-	-
Glintbord et al (32)	AS	41 (32.0–50.0)	72.0	5 (1.0–13.0)	-	6.5 (4.5–7.8)	5.9 (4.4–7.2)	5.0 (3.4–6.7)	-
Vastesaeger et al (29)	AS	39.5 (11.3)	75.6	-	85.0	-	6.5 (4.5–7.8)	5.4 (2.2)	-
Benavent et al, 2022 (30)	AS, nr-axSpA	54 (14.1)	66.1	-	74.7	-	5.6 (1.9)	-	3.3 (1.0)
Iannone et al (37)	SpA	47.8 (13.0)	54.0	74.9 (80.0)	-	-	-	-	-
Molto et al (41)	AS	41.1 (11.6)	53.3	6.1 (8.5)	64.6	-	5.7 (1.8)	-	3.3 (0.9)

*IBP of more than 3 months and less than 3 years of duration; ADA: Adalimumab; AS: Ankylosing spondylitis; ASAS-PR: Assessment in Ankylosing Spondylitis Partial Remission; ASDAS: Ankylosing Spondylitis Disease Activity Score; ASDAS-ID: Ankylosing Spondylitis Disease Activity Score Inactive Disease; axSpA: Axial spondyloarthritis; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASFI: Bath Ankylosing Spondylitis Functional Index; Cm: Centimetres; DD: Disease duration; F: Female; HLA: Human leukocyte antigen; IFX: Infliximab; M: Male; NPX: Naproxen; NR: Non-responder; nr-axSpA: Non-radiographic axial spondyloarthritis; NS: Non-switchers; PBO: Placebo; PsA: Psoriatic arthritis; R: Responder; S: Switchers; SD: Standard deviation; SpA: Spondyloarthritis; Yrs: Years.

Table 4. Predictors of remission in people with axSpA

Study reference	Definition of remission		Number of patients evaluated for remission, n	Percentage of patients in remission at the end of follow-up	Variables adjusted for in the analysis of predictors of remission	Predictors [OR (95% CI)	
	Time point	Remission criteria				Positive	Negative
Rudwaleit et al (21)	12 weeks	ASAS-PR	1159	27.7	Age, BASFI, CRP, BASMI, morning stiffness, PhGA, PGA, TBP, HLA-B27, prior TNFi therapy, ≥ 1 glucocorticoid (≤10 mg/day prednisolone equivalent)	HLA-B27 + [2.20 (1.40-3.45)] CRP [1.20 (1.12-1.28)]	Age [0.96 (0.95-0.97)] Prior TNFi [0.32 (0.21-0.47)] BASFI [0.77 (0.72-0.83)] BASMI [0.91 (0.85-0.99)]
Maksymowych et al (22)	12 weeks	ASAS-PR	315	ADA: 20.7 PBO: 3.7	Age, sex, disease duration, site location, treatment	ADA use [6.27 (2.16-18.19)]	Age [0.94 (0.91-0.98)]
Sieper et al (23)	5 years: sustained remission*	ASAS-PR ASDAS-ID	311	ASAS-PR: 45.0 ASDAS-ID: 55.0	Age, gender, disease duration, HLA-B27, BL anormal CRP, BL BASFI, BL syndesmophytes, BL TBP, BL BASDAI, BL PGA, BL PhGA, BL inflammation, wk 12 ASAS20, wk 12 ASAS40, wk 12 ASAS-PR, wk 12 ASDAS MI, wk 12 ASDAS-ID, wk 12 BASDAI50, treatment group	**ASAS-PR** Achievement of ASAS-PR at wk 12 [2.49 (1.40-4.43)] **ASDAS-ID** Achievement of ASDAS-ID at wk 12 [3.18 (1.83-5.53)]	**ASAS-PR** BASFI 0.98 (0.96 to 0.99)]; **ASDAS-ID** BASFI 0.99 (0.97-1.00)] CRP: 0.62 (0.40-1.00) Mean of BASDAI questions 5 and 6: 0.87 (0.77-0.97)]
Paccou et al (34)	6 (3–25) months after onset of TNFi	BASDAI <2; no peripheral disease + CRP ≤UNL	189	35.0	Age, CRP levels, HLA-B27 positivity, sex, disease duration, TNFi naivety	Male sex (p≤0.003) [¥], 1st vs 2nd TNFi [7.50 (2.60–21.60)] 3rd vs 2nd TNFi [5.20 (1.70-16.60)] 1st vs 3rd TNFi [1.40 (0.60–3.70)]	-
Baraliakos et al (28)	12 weeks	ASAS-PR	1198	18.2	Age of diagnosis, CRP, disease duration, age of diagnosis ≤40 vs >40 yrs; CRP ≤ULN vs >ULN; disease duration ≤2, 2 to ≤5, 5 to ≤10, >10 yrs; HLA-B27	Shorter disease duration (i.e., ≤2, 2 to ≤5, 5 to ≤10, >10 yrs) [¥] Younger age of diagnosis (≤40 vs >40 yrs) [¥] Age [¥] ETA vs SSZ/PBO [¥]	
Sieper et al (24)	28 weeks	ASAS-PR	150	AS: 57.4 nr-axSpA: 46.4	Type of treatment, age, sex, HLA-B27 status, baseline CRP and SIJ MRI score	IFX+NPX [5.79 (2.48-13.52)] HLA-B27 + [3.21 (1.01-10.15)]	Age [0.94 (0.89-0.99)]
Lubrano et al (39)	≥12months	ASAS-PR ASDAS-ID	340	-	-	Male sex [3.07 (1.59–5.94)]	-

Landewe et al (25)	40 weeks of sustained remission	ASAS-PR, ASDAS-ID	305	ADA ASDAS-ID: 57.0; ASAS-PR: 42.0 PBO ASDAS-ID: 33.0; ASAS-PR: 27.0	Age, symptom duration, disease duration, adalimumab concentration at week 28, and baseline and week 28 BASDAI, ASDAS, BASFI, PhGA, PGA, HAQ-S, hs-CRP, TBP, SPARCC MRI SIJ score, and SPARCC MRI spine score, HLA-B27, sex, anti-adalimumab antibodies at week 28; age ≤45 years or age ≤35 years at BL; positive MRI (SIJ or spine, or both) at BL and week 28; positive MRI SIJ at BL and week 28; concomitant DMARDs, NSAIDs, or corticosteroids at BL; hs-CRP ≥ULN at BL	PBO: Lower ASDAS at week 28¥ ADA: Lower ASDAS at week 28 ¥	
Shimabuco et al (33)	Last visit: 41.5 (0.5-116.1) months	ASDAS-ID	31	39.0	Age, SSZ, BASDAI		Age [0.94 (0.89–0.99) BASDAI [0.73 (0.54–0.97)]
Yahya et al (38)	6 months	BASDAI <1	508	10.4	Age, sex, date of symptom onset, date of diagnosis, HLA-B27, smoking history and presence of EAM	-	-
Hernández-Breijo et al (35)	12 months	BASDAI<2 + CRP ≤5 mg/L or ASDAS-ID	141	BASDAI-CRP: 25.0 ASDAS-ID: 29.0	Age, gender, disease duration, HLA-B27, BL BASDAI, CRP	Use of csDMARDs in overweight patients: [4.84 (1.09–21.36)]	-
Sieper et al (26)	3 months and final visit of 40-week double-blind randomised period	ASDAS-ID or ASAS-PR	Week 12: ASDAS-ID: 593 ASAS-PR: 596 Final visit: ASDAS-ID: 654	Week 12: ASDAS-ID: 35.2 ASAS-PR: 21.8 Final visit: ASDAS-ID: 54.4	Age, symptom duration, disease duration, BASDAI, ASDAS, BASFI, PhGA, PGA, HAQ-S, hs-CRP, morning stiffness, total back pain, SPARCC MRI SI joint score, and SPARCC MRI spine score, sex, age >35 years, age >45 years, hs-CRP ≥ normal (2.87 mg/L), presence of inflammation on MRI of the SI	**ASDAS-ID 12wk** Morning stiffness [1.22 (1.08-1.37)] HLA-B27 + [2.16 (1.31-3.57)] SPARCC MRI SI [1.03 (1.01-1.05)] Male sex [2.43 (1.64-3.53)] **ASAS-PR 12wk** hs-CRP [1.02 (1.01-1.04)] HLA-B27 + [2.32 (1.23-4.38)] SPARCC MRI SI [1.03 (1.02-1.05)] Male sex [1.93 (1.24-3.10)]	**ASDAS-ID 12wk** ASDAS [0.59 (0.44-0.79)] BASFI [0.84 (0.76-0.93)] Age >45y [0.39 (0.23-0.66)] SPARCC MRI Spine [0.96 (0.94-0.99)] **ASASP PR 12wk** HAQ-S [0.52 (0.34-0.80)] Age >45 [0.26 (0.11-0.58)] **ASDAS-ID final visit**

			ASAS-PR: 656	ASAS-PR: 40.7	joints and presence of inflammation on MRI of the SI joints and/or spine, the presence of HLA-B27, and concomitant DMARDs, NSAIDs and corticosteroids.	**ASDAS-ID final visit** Morning stiffness [1.15 (1.04-1.27)] HLA-B27 + [2.98 (1.91-4.64)] MRI + SI joint [1.85 (1.26-2.73)] Concomitant csDMARD [1.83 (1.19-2.83)] Male sex [1.74 (1.23-2.45)] **ASAS-PR final visit** Morning stiffness [1.15 (1.04-1.28)] HLA-B27 + [1.96 (1.25-3.05)] SPARCC MRI SI [1.03 (1.01-1.05)] Concomitant NSAID [1.61 (1.10-2.36)] Male sex [1.47 (1.04-2.08)]	Age [0.97 (0.95-0.98)] TBP [0.83 (0.74-0.93)] hsCRP>ULN [0.49 (0.34-0.70)] **ASAS-PR final visit** Age [0.96 (0.94-0.98)] TBP [0.81 (0.73-0.91)]
Nam et al (31)	3 months	ASDAS-ID or BASDAI<2 with normal CRP level	139	ASDAS-ID: 32.4 BASDAI-CRP**:** 39.9	ASDAS-ID: Age (10 years), syndesmophytes, 3Mo^{+}.ASDAS-CRP , 3Mo^{+}.PhGA, 3Mo^{+}.PtGA 3Mo^{+}.Pain, 3Mo^{+}.BASDAI BASDAI-CRP: Age (10 years), 3Mo^{+}.ASDAS-CRP, 3Mo^{+}.PhGA, 3Mo^{+}.PtGA, 3Mo^{+}.Pain, 3Mo^{+}.BASDAI, Normal3Mo^{+}.CRP	**ASDAS-ID** 3-Mo BASDAI improvement [1.70 (1.19–2.41) **BASDAI-CRP** 3-Mo BASDAI improvement [2.00 (1.45–2.76)] Normal CRP at 3Mo [3.72 (1.39–9.95)]	**ASDAS-ID** Age [0.67/10 years (0.49–0.93)] **BASDAI-CRP** Age (0.69/10 years (0.54–0.89)]
Ruyssen-Witrand et al (40)	60 months	ASAS-PR and/or ASDAS-ID plus no DMARDs and NSAIDs score ≤25 at the 5-year visit	412	18.0	Smoking, HLA-B27, swollen joint count, tender joint count, MASES, acute presentation at disease onset, comorbidities, symptom duration, ASDAS-CRP, BASFI, BASMI, ASAS-NSAID score, corticosteroid use, anti-TNF use, analgesic use between baseline and 4-year visit.	-	Symptom duration [0.66 (0.44-0.96) BL ASDAS-CRP [0.55 (0.34-0.86)] NSAIDs score [0.99 (0.98-0.99)] HAQ-S [0.32 (0.12-0.78)] Use of any DMARD [0.20 (0.08-0.41)]

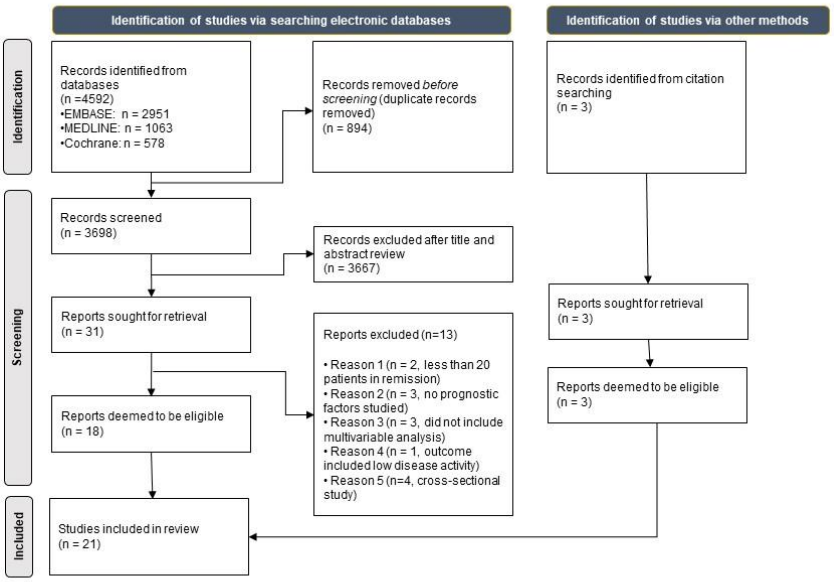
Pina Vegas et al (36)	60 months	ASDAS-ID	449	25.0	Age, sex, education level, BMI, active smoking, HLA-B27, history of peripheral arthritis, enthesitis index, BASDAI	**Never exposed to TNFi** History of peripheral arthritis [2.10 (1.20, 5.30)] **Exposed to TNF** Higher education level [2.90 (1.60, 5.10)]	**Never exposed to TNFi** BASDAI [0.90 (0.80, 0.90)] **Exposed to TNFi** Enthesitis index [0.80 (0.70, 0.90)] BASDAI [0.90 (0.90, 0.90)] BMI [0.80 (0.70, 0.90)]
Magrey et al (27)	12 months	ASDAS-ID ASAS-PR	187	ASDAS-ID: 37.4 ASAS-PR: 39.0	-	Improvement from BL to week 12 in back pain score ¥	
Glintborg et al (32)	6 months	BASDAI <4	794	66.0	Gender, age, disease duration, type of TNFI, BL CRP, BL MTX use, BL BASDAI	-	CRP >14 mg/l [0.39 (0.26-0.60)] BL BASFI [0.86 (0.77-0.99)] Age [0.98 (0.97-1.0)]
Vastesaeger et al (29)	6 months	ASAS-PR ASDAS-ID	635	-	CRP, BASFI, age and enthesitis score; treatment and HLA-B27 genotype	**ASDAS-ID** TNFi use [46.50 (6.40-339.60)] HLA-B27 + [2.40 (1.00-5.50)] Age ≤40 or >40 years [1.60 (1.00-2.60)] CRP high vs low [2.30 (1.30-4.20)] BASFI low vs high [3.20 (1.70-5.90)] BASFI moderate vs high [1.80 (1.00-3.50)] **ASAS-PR** TNFi use [16.80 (5.20-54.40)] HLA-B27 + [2.20 (1.00-5.00)] Age ≤40 or >40 years [1.60 (1.00-2.60)] CRP high vs low [2.10 (1.20-3.70)] BASFI low vs high [4.10 (2.20-7.60)] BASFI moderate vs high [2.60 (1.40-4.80)]	-

Benavent et al, 2022 (30)	At least three consecutive follow-up visits during the study period (2 years)	ASDAS-ID, BASDAI<2 and normal CRP	186	ASDAS-ID: 40% sustained remission; BASDAI-CRP: 14.8%	Gender, age at diagnosis, age at first biologic, HLA B27 positivity, BASDAI	**ASDAS-ID** Male sex [4.01 (1.83-8.77)] HLA-B27 + [4.30 (1.68-11.01)] **BASDAI-CRP** Male sex [3.19 (1.46-6.99)] Use of methotrexate [3.07 (1.39-6.78)]	**ASDAS-ID** Age at the beginning of biological therapy [0.96 (0.94-0.99)] **BASDAI-CRP** Age at the beginning of biological therapy [0.97 (0.95-0.99)]
Iannone et al (37)	-	ASDAS-ID	213	-	BL mRDCI, glucocorticoids, DMARDs, gender, age, HAQ, duration of disease, autoimmunity status	-	mRDCI [0.43 (0.20 - 0.92)]
Molto et al (41)	12 weeks	ASDAS-ID	508	24.8	Age, gender, X-ray sacroiliitis, MRI sacroiliitis, CRP, smoking status, HLA-B27 and absence of previous TNFi exposure	-	Fibromyalgia [0.4 (0.3 to 0.7)]

*Defined by at least three consecutive study visits spanning a period of at least 6 months at any point during the 5-year study; [+] change from baseline to 3 months; [¥] [OR (95% CI) or p-value] not available. ADA: Adalimumab; AS: Ankylosing spondylitis; ASAS: Assessment of SpondyloArthritis International Society; ASAS-PR: Assessment in Ankylosing Spondylitis Partial Remission; ASDAS: Ankylosing Spondylitis Disease Activity Score; ASDAS-ID: Ankylosing Spondylitis Disease Activity Score Inactive Disease; ASDAS MI: Ankylosing Spondylitis Disease Activity Score Major Improvement; axSpA: Axial spondyloarthritis; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASDAI50: 50% improvement in BASDAI; BASFI: Bath Ankylosing Spondylitis Functional Index; BASMI: Bath Ankylosing Spondylitis Metrology Index; BL: Baseline; BMI: Body mass index; CRP: C-reactive protein; csDMARDs: Conventional synthetic disease-modifying antirheumatic drugs; DMARDs: Disease-modifying antirheumatic drugs; EAM: Extra-articular manifestation; ESR: Erythrocyte sedimentation rate; ESSG: European Spondyloarthropathy Study Group; ETA: Etanercept; HAQ: Health Assessment Questionnaire; HAQ-AS: Health Assessment Questionnaire-Ankylosing Spondylitis; HAQ-S: Health Assessment Questionnaire for the Spondyloarthropathies; HLA: Human leukocyte antigen; hs-CRP: High sensitivity C-reactive protein; IFX: Infliximab; MASES: Maastricht Ankylosing Spondylitis Enthesitis Score; Mg/L: Milligram/Litter; Mo: Month; mRDCI: Modified Rheumatic Disease Comorbidity Index; MRI: Magnetic Resonance Imaging; mSASSS: Modified Stoke Ankylosing Spondylitis Spinal Score; MTX: Methotrexate; NPX: Naproxen; nr-axSpA: Non-radiographic axial spondyloarthritis; NSAID: Non-steroidal anti-inflammatory drug; PBO: Placebo; PGA: Patient global assessment of disease activity; PhGA: Physician global assessment of disease activity; RAPID3: Routine Assessment of Patient Index Data 3; SI: Sacroiliac; SIJ: sacroiliac joint; SJC: Swollen joint count; SPARCC: Spondyloarthritis Research Consortium of Canada; SSZ: Sulfasalazine; TBP: Total back pain; TJC: Tender Joint Count; TNFi: Tumour necrosis factor inhibitor; UNL: Upper normal limit; Wk: Week; Yrs: Years; 3Mo: Change from baseline to 3 months.

FIGURE LEGEND

Figure 1. Flow diagram of study selection



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ONLINE SUPPLEMENTARY TABLES

Supplementary Table 1. Search strategy		
MEDLİNE	**EMBASE**	**Cochrane**
1 exp Spondylitis/	1 exp spondylitis/	#1 MeSH descriptor: [Spondylitis, Ankylosing] explode all trees
2 (ankylos$ or spondyl$ or spondil$).mp.	2 (ankylos$ or spondyl$ or spondil$).mp.	#2 MeSH descriptor: [Spondylitis] explode all trees
3 SpA.mp.	3 SpA.mp.	#3 ankylos* or spondyl* or spondil*
4 (be?hterev$ or be?hterew$).mp.	4 (be?hterev$ or be?hterew$).mp.	#4 SpA
5 sacroilitis.mp.	5 non radiographic axial.mp.	#5 bechterev or bechterew or bekhterev or bekhterew
6 "nr-axSpA".mp.	6 nonradiographic axial.mp.	#6 sacroilitis
7 non radiographic axial.mp.	7 sacroilitis.mp.	#7 nr-axSpA
8 nonradiographic axial.mp.	8 "nr-axSpA".mp.	#8 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7
9 or/1-8	9 or/1-8	#9 MeSH descriptor: [Disease-Free Survival] explode all trees
10 disease-free survival/	10 remission/	#10 MeSH descriptor: [Progression-Free Survival] explode all trees
11 progression-free survival/	11 exp disease free survival/	#11 remission*
12 remission$.mp.	12 event free survival/	#12 "disease free" NEAR survival*
13 disease free survival$.mp.	13 exp progression free survival/	#13 "event free" NEAR survival*
14 event free survival$.mp.	14 remission$.mp.	#14 "progression free" NEAR survival*
15 progression free survival$.mp.	15 disease free survival$.mp.	#15 (disease OR spontaneous) NEAR/3 regression*
16 ((spontaneous$ or disease) adj3 regress$).mp.	16 event free survival$.mp.	#16 #9 or #10 OR #11 OR #12 OR #13 OR #14 OR #15
17 or/10-16	17 progression free survival$.mp.	#17 #8 AND #16
18 cohort$.mp.	18 ((spontaneous$ or disease) adj3 regress$).mp.	#18 cohort*
19 case control stud$.mp.	19 or/10-18	#19 "case control" NEAR stud*
20 comparative stud$.mp.	20 exp prognosis/	#20 comparative NEAR stud*
21 comparative study/	21 exp incidence/	#21 "cross sectional" NEAR stud*
22 cross sectional stud$.mp.	22 exp mortality/	#22 evaluation NEAR stud*
23 evaluation stud$.mp.	23 follow up/	#23 feasibility NEAR stud*
24 evaluation study/	24 exp case control study/	#24 longitudinal NEAR stud*
25 exp Cohort Studies/	25 cohort analysis/	#25 prospective NEAR stud*
26 exp case-control studies/	26 exp comparative study/	#26 retrospective NEAR stud*
27 Cross-Sectional Studies/	27 cross-sectional study/	
28 Feasibility Studies/	28 exp evaluation study/	

29 Program Evaluation/ 30 exp risk factors/ 31 exp treatment outcome/ 32 exp survival analysis/ 33 feasibility stud$.mp. 34 longitudinal stud$.mp. 35 prospective stud$.mp. 36 retrospective stud$.mp. 37 incidence/ 38 incidence.mp. 39 exp Mortality/ 40 mortality.mp. 41 follow up stud$.mp. 42 prognos$.mp. 43 predict$.mp. 44 course.mp. 45 (program evaluation$ or programme evaluation$).mp. 46 treatment outcome$.mp. 47 risk factor$.mp. 48 compar$.mp. 49 multivariat$.mp. 50 survival analysis.mp. 51 or/18-50 52 9 and 17 and 51	29 feasibility study/ 30 exp longitudinal study/ 31 exp program evaluation/ 32 prospective study/ 33 retrospective study/ 34 exp treatment outcome/ 35 exp risk factor/ 36 survival analysis/ 37 prognos$.mp. 38 incidence.mp. 39 mortality.mp. 40 predict$.mp. 41 course$.mp. 42 follow-up stud$.mp. 43 case-control stud$.mp. 44 cohort$.mp. 45 comparative stud$.mp. 46 cross-sectional stud$.mp. 47 evaluation stud$.mp. 48 feasibility stud$.mp. 49 longitudinal stud$.mp. 50 longitudinal stud$.mp. 51 (program evaluation$ or programme evaluation$).mp. 52 prospective stud$.mp. 53 retrospective stud$.mp. 54 treatment outcome$.mp. 55 risk factor$.mp. 56 compar$.mp. 57 multivariat$.mp. 58 survival analysis.mp. 59 or/20-58 60 9 and 19 and 59	#27 incidence #28 mortality #29 "follow up" NEAR stud* #30 prognos* #31 course #32 "survival analysis" #33 risk NEAR factor* #34 treatment NEAR outcome* #35 compar* #36 multivariat* #37 MeSH descriptor: [Comparative Study] explode all trees #38 MeSH descriptor: [Evaluation Study] explode all trees #39 MeSH descriptor: [Cohort Studies] explode all trees #40 MeSH descriptor: [Case-Control Studies] explode all trees #41 MeSH descriptor: [Cross-Sectional Studies] explode all trees #42 MeSH descriptor: [Feasibility Studies] explode all trees #43 MeSH descriptor: [Incidence] explode all trees #44 MeSH descriptor: [Mortality] explode all trees #45 MeSH descriptor: [Survival Analysis] explode all trees #46 MeSH descriptor: [Risk Factors] explode all trees #47 MeSH descriptor: [Treatment Outcome] explode all trees #48 #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31 OR #32 OR #33 OR #34 OR #35 OR #36 OR #37 OR #38 OR #39 OR #40 OR #41 OR #42 OR #43 OR #44 OR #45 OR #46 OR #47 1175800 #49 #8 AND #17 AND 48 161

Supplementary Table 2. Articles excluded and reason(s) for exclusion	
Reference	**Exclusion criteria**
Baraliakos X et al [1]	Less than 20 patients achieved remission status
Michelsen B et al [2]	No prognostic factors for remission described
Baraliakos X et al [3]	Did not include multivariable analysis
Kerber et al [4]	Did not include multivariable analysis
Lubrano E et al [5]	Less than 20 patients achieved remission status
Perrotta et al [6]	Did not include multivariable analysis
Gomez KNF et al [7]	Remission and low disease activity combined as the outcome of interest (rather than remission alone)
Garcia-Valle et al [8]	Cross-sectional study
Wilk et al [9]	Cross-sectional study
Bodur et al [10]	Cross-sectional study
Maksymowych et al [11]	No prognostic factors for remission described
Nam et al [12]	No prognostic factors for remission described
Wendling et al [13]	Cross-sectional study

Supplementary Table 3. Quality Assessment for Cohort Study (QUIPS) Evaluation			
Criteria	**Yes**	**No**	**Unsure**
Research question clearly stated			
Study participation			
Source population clearly described			
Method to identified population clearly described (e.g. referral patterns in health care)			
Recruitment period specified			
Place of recruitment specified			
Inclusion criteria specified			
Exclusion criteria specified			
Eligible individuals adequately participated			
Baseline characteristics of groups adequately described			
Baseline comparability of groups reported			
Study attrition			
Follow-up rate reported and adequate			
Attempts to collect information on drop-out participants described			
Lost to follow-up equal in both groups			
Lost to follow-up patients characterized			
Reasons for loss to follow-up described			
Lost to follow-up patients not significantly different from study completers			
Prognostic factor measurement			
Prognostic factor measured clearly defined or described			
Prognostic factor measure and method used valid and reliable			
Cut-offs for continuous variables specified			
Proportion of sample had complete data for prognostic factor adequate			
Method and setting of factor measurement the same for all participants			
Method used to account for missing data appropriate (if imputation used)			
Outcome measurement			
Outcome of interest clearly defined			

Outcome of interest valid			
Duration of follow-up adequate			
Blinded outcome assessment			
Outcome measure and method used valid and reliable			
Method and setting of measurement the same for all participants			
Confounding measurement and account			
Confounding variables clearly defined			
Confounding variables measured, valid and reliable			
Similar confounding variable measurement in all study participants			
Confounding variables accounted for in study design (e.g. matching for key variables, stratification, or initial assembly of comparable groups)			
Methods to account for missing confounder data in analysis appropriate			
Confounding variables accounted for in the analysis (e.g. appropriate adjustment for confounders)			
Analysis			
Pre-planned sample size with adequate power			
Appropriate statistical analysis			
Verifiable results from the data			
Appropriate strategy for model building based on a conceptual framework			
Selected model adequate for the study design			
No selective reporting of results			
Instructions: Yes = Met criteria; No = Not met criteria; Not sure = no adequate data to evaluate, not mentioned in the article; N/A = Not applicable.			

Supplementary table 4. Predictors of remission in people with axSpA					
Predictors	**Study**	**Time point of assessment**	**Remission criteria and adjusted estimate of the association**		
			ASAS-PR	**ASDAS-ID**	**BASDAI remission**
Socio-demographic factors, comorbidities and axSpA subtype					
Age and age of diagnosis	Rudwaleit et al [14]	12 weeks	0.96 (0.95-0.97)		
	Maksymowych et al [15]	12 weeks	0.94 (0.91-0.98)		
	Baraliakos et al [16]	12 weeks	Age: negative predictor Younger age at diagnosis (≤40 vs >40 years): positive predictor		
	Sieper et al [17]	28 weeks	0.94 (0.89-0.99)		
	Shimabuco et al [18]	Median follow-up: 41.5 (0.5-116.1) months		0.94 (0.89–0.99)	
	Sieper et al [19]	3 months	>45 years: 0.26 (0.11-0.58)	>45 years: 0.39 (0.23-0.66)	
		Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	0.96 (0.94-0.98)	0.97 (0.95-0.98)	
	Nam et al [20]	3 months		Per 10 years increase: 0.67 (0.49–0.93)	Per 10 years increase: 0.69 (0.54-0.89)
	Glintbord et al [21]	6 months			0.98 (0.97-1.00)
	Vastesaeger et al [22]	6 months	Age ≤40 or >40 years: 1.60 (1.00-2.60)	Age ≤40 or >40 years: 1.60 (1.00-2.60)	
	Benavent et al [23]	At least three consecutive follow-up visits during the study period (2 years)		Age: 0.96 (0.94-0.99)	Age: 0.97 (0.95-0.99)
Gender	Paccou et al [24]	6 (3–25) months			(BASDAI<2; no peripheral joint disease and CRP within normal values)

					Male (p≤0.003)[¥]
	Lubrano et al [25]	At least 12 months	Male: 3.07 (1.59–5.94)		
	Sieper et al [19]	3 months	Male: 1.93 (1.24-3.10)	Male: 2.43 (1.64-3.53)	
		Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	Male: 1.47 (1.04-2.08)	Male: 1.74 (1.23-2.45)	
	Benavent et al [23]	At least three consecutive follow-up visits during the study period (2 years)		Male: 4.01 (1.83-8.77)	Male: 3.19 (1.46-6.99)
Disease duration	Baraliakos et al [16]	12 weeks	Disease duration categories (≤2, 2 to ≤5, 5 to ≤10, >10 yrs): Positive predictor [¥]		
	Ruyssen-Witrand et al [26]	60 months	Symptom duration: 0.66 (0.44-0.96)		
Higher education level	Pina Vegas et al [27]	60 months	2.90 (1.60-5.10)		
BMI	Pina Vegas et al [27]	60 months	0.80 (0.70-0.90)		
Modified Rheumatic Disease Comorbidity Index	Iannone et al [28]	-	0.43 (0.20 - 0.92)		
Fibromyalgia	Molto et al [29]	12 weeks		0.4 (0.3 to 0.7)	
Laboratory and imaging factors					
HLA-B27+	Rudwaleit et al [14]	12 weeks	2.20 (1.40-3.45)		
	Baraliakos et al [16]	12 weeks	positive association[¥]		
	Sieper et al [17]	28 weeks	3.21 (1.01-10.15)		
	Sieper et al [19]	3 months	2.32 (1.229-4.377)	2.16 (1.31-3.57)	

		Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	1.96 (1.254-3.047)	2.98 (1.91-4.64)	
	Vastesaeger et al [22]	6 months	2.20 (1.00-5.00)	2.40 (1.00-5.50)	
	Benavent et al [23]	At least three consecutive follow-up visits during the study period (2 years)		4.30 (1.68-11.01)	
CRP	Rudwaleit et al [14]	12 weeks	1.20 (1.12-1.28)		
	Sieper et al [30]	Sustained remission*		0.62 (0.40-1.00)	
	Sieper et al [19]	3 months	hs-CRP: 1.02 (1.01-1.04)		
		Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28		hsCRP >UNL: 0.49 (0.34-0.70)	
	Nam et al [20]	3 months			(BASDAI<2 with normal CRP level) Normalized CRP at 3 months: 3.72 (1.39–9.95)
	Glintbord et al [21]	6 months			CRP >14 mg/l: 0.39 (0.26-0.60)
	Vastesaeger et al [22]	6 months	2.10 (1.20-3.70)	2.30 (1.30-4.20)	
SPARCC MRI SI joint	Sieper et al [19]	3 months	1.03 (1.02-1.05)	1.03 (1.01-1.05)	
		Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	1.03 (1.01-1.05)		
SPARCC MRI Spine	Sieper et al [19]	3 months		0.96 (0.94-0.99)	
Positive MRI of the SI joint	Sieper et al [19]	Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28		1.85 (1.26-2.73)	
Clinical scores and evaluations					
BASDAI	Shimabuco et al [18]	41.5 (0.5-116.1) months		At baseline: 0.73 (0.54–0.97)	
	Nam et al [20]	3 months		3-month BASDAI improvement: 1.70 (1.19–2.41)	(BASDAI<2 with normal CRP level) 2.00 (1.45–2.76)

	Pina Vegas et al [27]	60 months		Never exposed to TNFi: 0.90 (0.80-0.90) Exposed to TNFi: 0.90 (0.90-0.90)	
	Sieper et al [30]	Sustained remission*		Mean of BASDAI questions 5 and 6: 0.87 (0.77-0.97)	
ASDAS-CRP	Sieper et al [19]	3 months		0.59 (0.44-0.79)	
	Ruyssen-Witrand et al [26]	60 months	Baseline: 0.55 (0.34-0.86)		
	Landewé et al [31]	40 weeks of sustained remission	Placebo group: Lower at week 28: Positive predictor ¥ Adalimumab group: Lower at week 28: Positive predictor ¥	Placebo group: Lower at week 28: Positive predictor ¥ Adalimumab group: Lower at week 28: Positive predictor ¥	
BASFI	Rudwaleit et al [14]	12 weeks	0.77 (0.72-0.83)		
	Sieper et al [30]	Sustained remission*	HR 0.98 (0.96 - 0.99)	HR 0.99 (0.97 - 1.00)	
	Sieper et al [19]	3 months		0.84 (0.76-0.93)	
	Glintbord et al [21]	6 months			(BASDAI<4) At baseline: 0.86 (0.77-0.99)
	Vastesaeger et al [22]	6 months	Low vs high: 4.10 (2.20-7.60) Moderate vs high: 2.60 (1.40-4.80)	Low vs high: 3.20 (1.70-5.90) Moderate vs high: 1.80 (1.00-3.50)	
BASMI	Rudwaleit et al [14]	12 weeks	0.91 (0.85-0.99)		
Week 12 ASAS-PR achievement	Sieper et al [30]	Sustained remission*	HR 2.49 (1.40-4.43)		

Week 12 ASDAS-ID achievement	Sieper et al [30]	Sustained remission*		HR 3.18 (1.83-5.53)	
HAQ-S	Sieper et al [19]	3 months	0.52 (0.34-0.80)		
	Ruyssen-Witrand et al [26]	60 months	0.32 (0.12-0.78)		
Total back pain	Sieper et al [19]	Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	0.81 (0.73-0.92)		0.83 (0.74-0.93)
Improvement from BL to week 12 in back pain score	Magrey et al [32]	12 months	Positive predictor (Not mentioned which criteria was used) ¥		
Morning stiffness	Sieper et al [19]	3 months			1.22 (1.08-1.37)
		Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	1.15 (1.04-1.28)		1.15 (1.04-1.27)
History of peripheral arthritis	Pina Vegas et al [27]	60 months	Never exposed to TNFi: 2.10 (1.20-5.30)		
Enthesitis index	Pina Vegas et al [27]	60 months	Exposed to TNFi: 0.80 (0.70-0.90)		
Treatments					
TNFi therapy	Rudwaleit et al [14]	6 months	Prior TNFi therapy: 0.32 (0.21-0.47)		
	Maksymowych et al [15]	12 weeks	Treatment with adalimumab: 6.27 (2.16-18.19)		

	Paccou et al [24]	6 (3–25) months			(BASDAI<2; no peripheral joint disease and CRP within normal values) First TNFi vs second TNFi: 7.50 (2.60–21.60), First TNFi vs third TNFi: 1.40 (0.60–3.70), Third TNFi vs second TNFi: 5.20 (1.70–16.60)
	Vastesaeger et al [22]	6 months	TNFi vs conventional: 16.80 (5.20-54.40)	TNFi vs conventional: 46.50 (6.40-339.60)	
	Sieper et al [17]	28 weeks	5.79 (2.48-13.52)		
	Baraliakos et al [16]	12 weeks	Positive predictor ¥		
Analgesics / NSAIDs	Sieper et al [19]	Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28	Concomitant NSAID: 1.61 (1.09-2.36)		
	Ruyssen-Witrand et al [26]	60 months	NSAIDs score: 0.99 (0.98-0.99)		
Use of csDMARDs	Hernandez-Breijo et al [33]	12 months			(BASDAI<2 and CRP ≤5 mg/L) in overweight/obese patients: 4.84 (1.09–21.36)
	Sieper et al [19]	Final visit of either at week 2, 4, 8, 12, 16, 20, 24 or 28		1.83 (1.19-2.83)	
	Benavent et al [23]	At least three consecutive follow-up visits during the study period (2 years)			Use of methotrexate: 3.07 (1.39-6.78)
Use of any DMARD	Ruyssen-Witrand et al [26]	60 months	0.20 (0.08-0.41)		

*Defined by at least three consecutive study visits spanning a period of at least 6 months at any point during the 5-year study.

¥ [OR (95% CI) or p-value not available; ASAS: Assessment of SpondyloArthritis International Society; ASAS-PR: Assessment in Ankylosing Spondylitis Partial Remission; ASDAS: Ankylosing Spondylitis Disease Activity Score; ASDAS-ID: Ankylosing Spondylitis Disease Activity Score Inactive Disease; axSpA: Axial spondyloarthritis; BASDAI: Bath Ankylosing Spondylitis Disease Activity Index; BASFI: Bath Ankylosing Spondylitis Functional Index; BASMI: Bath Ankylosing Spondylitis Metrology Index; BL: Baseline; BMI: Body mass index; CRP: C-reactive protein; csDMARDs: conventional synthetic disease-modifying antirheumatic drugs; ESR: Erythrocyte sedimentation rate; ESSG: European Spondyloarthropathy Study Group; HAQ-S: Health Assessment Questionnaire for the Spondyloarthropathies; HLA: Human leukocyte antigen; hs-CRP: High sensitivity C-reactive protein; IFX: Infliximab; MRI: Magnetic Resonance Imaging; NPX: Naproxen; NSAID: Non-steroidal anti-inflammatory drug; SI: Sacroiliac; SPARCC: Spondyloarthritis Research Consortium of Canada; TNFi: Tumour necrosis factor inhibitor; UNL: Upper normal limit; Yrs: Years.

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