



Need for Early Intensification of Therapy and Strategies to Improve Utilization of Biologic Therapies in Spondyloarthritis: Experiences and Perspectives of Indian Rheumatologists

Rohini Handa¹, Sundeep Upadhyaya², Sarath Chandra Mouli Veeravali³, Lalit Duggal⁴, Santosh Kumar Mandal⁵, Shashank M Akerkar^{6,5}, Syamasis Bandyopadhyay⁷, Sagar Panchal^{8*}

Received: 03 March 2026; Accepted: 04 June 2026

ABSTRACT

Spondyloarthritis (SpA) is a group of inflammatory diseases affecting joints and the spine, often diagnosed late, leading to poor outcomes and quality-of-life impairment. In India, delays in SpA diagnosis stem from low awareness, shortage of rheumatologists, inadequate screening, and circuitous referral pathways. Early diagnosis and effective treatment are crucial for improving outcomes and preventing irreversible damage. Although conventional DMARDs are commonly used for Indian SpA patients, they have limited efficacy and toxicity, necessitating a shift to biologics and targeted therapies for those with significant disease activity. Despite proven efficacy and safety in trials, the use of biologics in bio-eligible patients who fail conventional therapy with SpA in India remains low due to economic constraints, healthcare system limitations, regulatory and supply challenges, patient resistance from fear of adverse events, and gaps in physician awareness. In this narrative review, input was collected from seven recognized rheumatology experts across multiple geographic zones in India, representing diverse clinical experience in both government and private hospital settings, through iterative rounds of draft exchanges via email. Strategies to improve early diagnosis, enhance the use of biologics, and develop India-specific protocols for treatments, with special emphasis on implementing the top-down treatment approach, have also been discussed. A multifaceted approach is needed to improve the use of biologics for SpA in India alongside strengthening diagnostic capabilities and promoting unified effort among key stakeholders. Expanding insurance coverage for biologics and streamlined regulatory pathways can further play an essential role in reducing financial and logistical barriers in SpA management.

Keywords: Ankylosing spondylitis, Biologic disease-modifying antirheumatic drugs, India, Psoriatic arthritis, Spondyloarthritis.

Journal of The Association of Physicians of India (2026); 10.59556/japi.74.1658

INTRODUCTION

Spondyloarthritis (SpA) is a heterogeneous group of inflammatory rheumatic diseases that primarily affect the axial skeleton, particularly the spine and sacroiliac joints, and are often accompanied by peripheral joint involvement, enthesitis, and extra-articular manifestations such as uveitis, psoriasis, and inflammatory bowel disease. SpA significantly impairs quality of life due to chronic pain, stiffness, fatigue, and reduced physical function, often leading to socioeconomic hardship.^{1–3} The SpA spectrum includes radiographic axial SpA (axSpA) or ankylosing spondylitis (AS), characterized by structural damage visible on imaging; nonradiographic axSpA, which lacks definitive radiographic findings but shares clinical features with AS; psoriatic arthritis (PsA), which combines inflammatory arthritis with skin and nail psoriasis; enteropathic arthritis (EnA), associated with inflammatory bowel diseases; reactive arthritis (ReA), typically triggered by infections; undifferentiated SpA (USpA), which does not meet criteria for

a specific subtype; and juvenile SpA (JSpA), which begins in childhood.^{4,5} SpA is usually seronegative for rheumatoid factor and shows strong genetic associations with HLA-B27, as well as other loci such as ERAP-1 and IL-23R.^{6,7} Advances in MRI for detecting early inflammatory changes and the identification of key inflammatory mediators—including TNF- α , IL-23, and IL-17—have improved diagnosis and led to the development of targeted biologic therapies.⁸

Spondyloarthritis affects about 1% of the global population, with prevalence ranging from 0.01% in Japan to 2.5% in Northern Arctic communities.⁹ Data on SpA in South Asia, particularly India, remain limited and inconsistent. In India, the prevalence of HLA-B27 among SpA patients varies widely, with national estimates around 90%,^{10,11} but only 54% reported in a Southern Indian tertiary center.¹² The WHO-ILAR COPCORD survey (2000–2010) documented a substantial burden of SpA across both urban and rural Indian populations, especially among men aged

25–34 years.¹³ A Northeastern Indian study reported a male-to-female ratio of 3.2:1, reflecting the global trend toward narrowing gender disparities in SpA diagnosis.¹⁴

Spondyloarthritis is associated with physical disability and psychological distress, resulting in substantial disease burden.^{3,15–17} It predominantly affects young individuals, with symptom onset typically occurring before the age of 45 and peaking in the third decade of life (median onset age: 26–31 years), a group that represents a significant portion of the workforce.^{18–20} Thus, SpA morbidity adds to the overall economic costs of the disease, over and beyond direct medical costs because of increased absenteeism and work disability, and increased withdrawal from the workforce.²¹ Furthermore, visible skin damage associated with SpA variants, such as PsA, contributes to stigma, leading to difficulties in securing and retaining jobs, and resulting in financial instability for many patients.²² Up to 30% of patients with PsA

^{1,2}Senior Consultant, Department of Rheumatology, Indraprastha Apollo Hospitals, New Delhi; ³Clinical Director, Department of Clinical Immunology & Rheumatology, Krishna Institute of Medical Sciences, Secunderabad, Telangana; ⁴Chairman, Department of Rheumatology & Clinical Immunology, Sir Ganga Ram Hospital, New Delhi; ⁵Consultant Rheumatologist, Department of Clinical Immunology and Rheumatology, Rabindranath Tagore International Institute of Cardiac Sciences (RTIICS), Kolkata, West Bengal; ⁶Consultant Rheumatologist, Department of Rheumatology, Mumbai Arthritis Clinic and Research Centre, Mumbai, Maharashtra; ⁷Senior Consultant Physician, Department of Internal Medicine & Rheumatology, Apollo Multispecialty Hospital, Kolkata, West Bengal; ⁸Therapeutic Area Lead – Immunology, Department of Medical Affairs, Johnson and Johnson Pvt Ltd, Mumbai, Maharashtra, India; *Corresponding Author

How to cite this article: Handa R, Upadhyaya S, Mouli Veeravali SC, *et al.* Need for Early Intensification of Therapy and Strategies to Improve Utilization of Biologic Therapies in Spondyloarthritis: Experiences and Perspectives of Indian Rheumatologists. *J Assoc Physicians India* 2026;74(10):e13–e21.

report significant work impairment, and unemployment rates among this population are disproportionately high.²²

Studies indicate that 20–40% of patients experience anxiety or depression, while suicidal ideation is reported in 10% of individuals aged 18–34 years.²³ Negative body image, low self-esteem, and social withdrawal are common, driven by a combination of physical symptoms and social stigmatization.²⁴ Thus, early diagnosis and treatment tailored to individual needs are crucial to reduce the impact of the disease, optimize outcomes, and improve the overall well-being of patients with SpA. Multidisciplinary approaches involving rheumatologists, dermatologists, radiologists, orthopedicians, physiotherapists, ophthalmologists, and gastroenterologists are often necessary to address the multifaceted nature of the disease and provide holistic care.

MATERIALS AND METHODS

This review is a narrative synthesis of the current literature on SpA, supported by experiences and perspectives of expert rheumatologists from India. Seven expert rheumatologists from across India were selected based on their interest in contributing to the project and their availability to provide input. These experts represent diverse clinical experience across both government and private healthcare settings, as well as different geographic regions within India. Inputs from the experts were collected through two iterative rounds of email-based draft exchanges to gather structured feedback. Although not a formal Delphi process, this approach enabled refinement of key clinical insights and recommendations based on the collected evidence and expert perspectives across varied healthcare settings in India. Experts reflected on the epidemiology and treatment practices within the Indian healthcare landscape, highlighting real-world challenges and outlining strategies to improve biologic utilization. Inputs focused

on the epidemiology and burden of SpA, current treatment challenges, barriers to the adoption of biologic therapies, and a holistic approach to improving biologic penetration at all levels of healthcare, including awareness, physician training, insurance coverage, and policy support.

Literature Search

A targeted literature search was conducted in January and February 2025 across PubMed, Cochrane, and Google Scholar using the following keywords: *spondyloarthritis, SpA, spondyloarthritides, management of SpA, targeted therapy, biologic agents, India, and early intensification*. “Early treatment intensification” can be defined as: As per ASAS EULAR 2022 guidelines, *TNFi, IL-17i, or JAKi should be considered in patients with persistently high disease activity despite conventional treatments; current practice is to start a TNFi or IL-17i*. After failure of conventional therapy, treatment intensification should be considered for patients with persistently high disease activity.²⁵ Searches were restricted to articles published in English with data on adults with SpA. Abstracts and/or articles without sufficient details with five or fewer patients cases were excluded.

Need for Early Intensification

Diagnostic Delay in India

Timely diagnosis of SpA allows for early treatment, slowing disease progression and preventing joint damage. Patients with SpA are known to experience a long lag between the onset of symptoms and diagnosis, averaging 3–11 years.^{3,10,21,26} This diagnostic delay stems from a lack of awareness about the disease and its treatments, waxing and waning course of the disease, patient hesitancy in seeking specialist opinion, socioeconomic factors, and inefficiencies of the referral system. These delays have serious ramifications that include heightened disease activity,

reduced spinal mobility, and concomitant functional limitations, as well as reduced treatment efficacy.^{3,26,27}

A recent study collected data from the Indian Rheumatology Association (IRA) database for the assessment of diagnostic and referral delays prevalent in India and reported that the average delay in referrals for patients with PsA and SpA was 16.3–17.5 months, respectively.²⁶ Studies have earlier reported longer mean delays of 5–7 years across different parts of India.²⁸ A general lack of awareness about rheumatologic conditions was cited as the primary reason for delay by most of the patients.²⁶ Additionally, 65% of PsA and 74% of SpA patients were initially managed by nonrheumatology specialists; more than 25% of primary care clinicians were unaware of the rheumatology specialty, and nearly 47% of the PsA cases were misdiagnosed by the primary care physician. About 8% of patients in both groups expressed concerns about the potential adverse effects of modern medical treatments.²⁶ In another Indian study, patients with a delayed diagnosis of SpA (greater than 2 years after symptom onset) had poorer outcomes in terms of work productivity and activities of daily living than patients with early diagnosis (within 2 years of symptom onset); with women in particular having longer diagnostic delays.²¹ The first point of contact for most patients was a nonrheumatologist, and nearly 69% of the patients received an incorrect diagnosis (including sciatica, mechanical injury, pregnancy-induced back pain, osteoporosis, neuropathy, etc.) before consulting a rheumatologist.²¹ Thus, factors contributing to a delay in diagnosis in India include socioeconomic barriers, lack of awareness of inflammatory (nonmechanical) back pain, intermittent symptoms, insufficient number of rheumatologists, inadequate and ineffective screening in clinical practice, inefficient referral pathways, lack of multidisciplinary care, etc.^{21,26,29} Key studies from India on diagnostic delay in SpA are presented in Table 1.

Table 1: Key studies for diagnostic delays of SpA in India

Study	Sample size	Delay duration	Outcomes
Reddy et al. ²¹	n = 100	Median: 5 years	axSpA reduced work productivity and leads to work disability
Chandrashekar et al. ²⁶	n = 1,155	Median: 1.4 years	Two major reasons for delayed referral of SpA include lack of awareness of rheumatology as a specialty and patients being managed by other specialties
Gavali et al. ³⁴	Nonradiographic SpA: n = 41 Radiographic SpA: n = 55	Nonradiographic SpA: Mean: 1.3 years Radiographic SpA: Mean: 4.4 years	Demographic, clinical characteristics, and frequency of HLA-B27 positivity were similar between the groups

axSpA, axial spondyloarthritis; nr-axSpA, nonradiographic axSpA; r-AS, radiographic axSpA; SpA, spondyloarthritis

Evolved Understanding of Pathophysiology and Natural Course of Disease

Significant advancements in unraveling the pathogenesis and management of SpA have been made over the past two decades. This has supported the development of targeted therapies and a range of biologic agents such as TNF- α inhibitors, blockers of the IL-17/IL-23 axis, and Janus kinase inhibitors (JAKi), that have demonstrated treatment efficacy with a manageable safety profile in bioeligible patients.^{25,30}

Based on an evolved understanding of its manifestations and clinical course over time, axSpA is further divided into two subtypes: (a) nonradiographic axSpA (nr-axSpA), which includes patients without visible structural damage on plain radiographs, and (b) radiographic axSpA (r-axSpA), with visible structural damage to the sacroiliac joints or spine, observable on plain radiographs.³¹ Although nr-axSpA is considered an early, milder form, approximately 10% of patients with nr-axSpA progress to r-axSpA within 2 years, 26–60% progress within 10–15 years after symptom onset.^{31,32}

A recent study identified a substantially lower frequency of nr-axSpA in Asian countries compared with other regions of the world. Patients with nr-axSpA in Asian countries, including India, were predominantly male and had earlier disease onset with more axial symptoms, higher Bath Ankylosing Spondylitis Metrology Index (BASMI) and more frequent HLA-B27 positivity, as well as a better response to nonsteroidal anti-inflammatory drugs (NSAIDs).^{32,33} An Indian study that used the Assessment of Spondyloarthritis International Society (ASAS) criteria to classify radiographic and nonradiographic cases found that the clinical profile, disease activity, and frequency of HLA-B27 positivity were the same in both groups.³⁴ However, patients with radiographic disease were older (mean age 33.7 vs 26.5 years), had longer lead time from symptom onset to diagnosis (4.4 vs 1.3 years), and had a higher frequency of positive family history of SpA (29% vs 9.7%) than patients with nonradiographic features.³⁴ Overall findings suggest that r-axSpA is more severe and poses a greater physical, psychological, and socioeconomic burden compared to nr-axSpA, highlighting the need for early diagnosis and treatment in bio-eligible patients to slow or halt progression from nr-axSpA to r-axSpA.

The Impact of Continued Disease Progression on the Development of Other Conditions or Comorbidities

The impact of continued disease progression in SpA is of significant concern due to its chronic and progressive nature. In patients with SpA, continued disease progression can lead to structural damage in the sacroiliac joints and spine, which results in impairments in function, mobility, and health-related quality of life.³⁵ Studies on radiographic structural progression show that patients diagnosed late often have more extensive and irreversible damage to the sacroiliac joints or spine than those diagnosed earlier.³³ Furthermore, the impact of SpA on work productivity is substantial, given that the disease has an early age of onset, and disease progression contributes to significant financial losses and socioeconomic burden.^{21,36} In the Indian context, where access to healthcare and treatment options may vary, it is crucial to address disease progression effectively.

The underlying inflammatory pathophysiology and persistent inflammation in SpA have been known to contribute to structural damage, which includes erosion, sclerosis, and eventual ankylosis. SpA typically develops due to the activation of inflammatory pathways triggered by a combination of genetic factors, gut dysbiosis, recurrent infections, and mechanical stress. Inflammation plays a central role not only in the progression of radiographic changes but also in driving pain, stiffness, and fatigue that impair patients' quality of life.^{37,38} The proinflammatory cytokines, such as TNF- α and IL-17, are known to contribute to the pathogenesis, exacerbating inflammation in affected tissues and stimulating new bone formation, which eventually leads to spinal fusion.³⁹ Studies have also highlighted the systemic nature of this inflammation, which can result in many comorbidities such as uveitis, psoriasis, inflammatory bowel disease, and metabolic syndrome during the clinical course of SpA and related conditions.³⁸ Individuals with SpA from Asia have been reported to have a higher prevalence of comorbidities such as osteoporosis, cardiovascular diseases, infections, malignancies, and fibromyalgia compared to the general population. This increased burden of comorbidities leads to considerable functional impairments, reduced quality of life, higher work disability, elevated mortality rates, and complicates the overall management of SpA.^{32,40}

Management of SpA

Limitations of Nonsteroidal Anti-inflammatory Drugs in Halting Radiographic Progression

NSAIDs are used in the first line of treatment in all subtypes of SpA^{25,29,30} and have been demonstrated to effectively reduce inflammation, as evidenced by improvements in osteitis of the spine and sacroiliac joints, as well as bone marrow edema in the sacroiliac joints.⁴¹ The efficacy of NSAIDs in halting radiographic progression is mired in controversy, with studies reporting both successes and failures.⁴² While some studies have shown decreased radiographic progression in patients with elevated C-reactive protein (CRP) levels with long-term, uninterrupted use of high-dose NSAIDs,^{3,43,44} other studies have failed to show any such differences in patients with AS treated with NSAIDs.⁴² Despite the potential benefits of high-dose continuous use of NSAIDs, it is difficult to implement in the long-term, given their propensity for gastrointestinal, renal, and cardiovascular toxicities.⁴⁵ A third of patients are unable to tolerate high-dose NSAIDs, and only a minority adhere to this regimen.^{46,47}

Limited Role of csDMARDs in Predominant axSpA or Axial-PsA

Conventional synthetic disease-modifying antirheumatic drugs (csDMARDs), such as sulphasalazine and methotrexate, may offer limited benefits for patients with peripheral joint disease, but are generally ineffective in those with axial disease.^{48,49} Only limited evidence supports the use of csDMARDs in the treatment of AS, SpA and axSpA. A comprehensive review showed sulfasalazine's minimal to no effect on pain reduction, disease activity, physical function, or spinal mobility in patients with AS vs placebo.⁵⁰ Additionally, the review noted a higher incidence of adverse events of gastrointestinal disturbances and skin reactions, leading to drug discontinuation. Thus, for patients with a limited response to, contraindications, or intolerance to NSAIDs, the most effective current treatment options are biologic DMARDs (bDMARDs), such as TNF- α inhibitors, monoclonal antibodies targeting the IL-17A, IL-23 axis, or JAKi.^{51,52} Studies from India have highlighted the substantial use of NSAIDs and csDMARDs in patients with axial symptoms.^{27,53,54} Despite the limitations of csDMARD use in SpA, given their low cost, these are used commonly in Indian patients with SpA, even for axial disease.^{53,54}

Limitations of Janus Kinase Inhibitors

Following an inadequate response to csDMARDs, the international guidelines recommend JAKi, a class of targeted synthetic DMARDs, as second-line treatment for patients with PsA.²⁵ JAK inhibitors have also been approved for use in axSpA, and recent guidelines such as those from the British Society for Rheumatology (BSR) support their use in appropriate clinical scenarios.⁵⁵ Tofacitinib, an oral nonselective JAKi with preferential selectivity for JAK3 and JAK1, has demonstrated limited efficacy in SpA.^{56,57} While some studies suggest potential benefits of tofacitinib in reducing radiographic progression in specific cases of SpA, recent real-world data highlight poor treatment retention rates and high discontinuation due to ineffectiveness or adverse events.⁵⁸ A real-world study reported discontinuation of tofacitinib treatment in 36% of patients with rheumatoid arthritis after a mean follow-up of 17.3 months,⁵⁹ while discontinuation rates due to ineffectiveness or intolerance of tofacitinib were 46% and 30%.⁶⁰ In patients with rheumatoid arthritis, major adverse cardiovascular events (MACE) and cancers occurred more frequently with tofacitinib compared to TNFi.⁶¹ Most JAKi, including baricitinib (odds ratio [OR]: 3.46, 95% CI: 1.38, 8.67), peficitinib (OR: 6.06, 95% CI: 1.76, 20.82), and tofacitinib (OR: 1.96, 95% CI: 1.01, 3.78), have been associated with a higher incidence of herpes zoster infection compared with placebo.⁶² Given their efficacy and oral administration route, JAKi represent a valuable addition to the treatment armamentarium for bio-eligible patients with SpA. However, their use should be guided by careful patient selection, with particular caution in older patients or those with cardiovascular risk factors. Further long-term data are needed to define their optimal role in the management of SpA.

Step-up Approach in the Management of SpA

The traditional step-up approach in the treatment of SpA typically begins with the use of NSAIDs as first-line therapy. If patients do not respond adequately to NSAIDs or if disease progression occurs, the treatment is then escalated to include DMARDs as necessary.⁶³ However, this step-up approach has limitations, including the potential for delayed disease control and suboptimal outcomes. Recognizing these, several recent guidelines advocate for a more personalized and expedited treatment strategy, namely early initiation of DMARDs in bioeligible patients with aggressive or refractory disease.^{25,30,64}

The treat-to-target strategy that calibrates treatment to disease activity measures is now the preferred approach to optimizing treatment outcomes in SpA.^{65,66} Briefly, this approach involves defining clear treatment goals based on disease activity measures, such as CRP levels, erythrocyte sedimentation rate, and patient-reported outcomes such as the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) and Bath Ankylosing Spondylitis Functional Index (BASFI).^{65,66} A growing body of evidence supports early initiation of bDMARDs and targeted DMARDs to achieve minimal or low disease activity and delay disease progression in a significant proportion of bioeligible patients.^{35,67}

Studies of early initiation of TNFi or IL-17 inhibitors demonstrated rapid and sustained reductions in disease activity, pain, and inflammation, accompanied by improvements in quality of life.^{68–70} These studies suggest that bDMARDs may effectively inhibit radiographic progression in bio-eligible patients with AS, including those with nonradiographic disease.^{68–70} By adopting a proactive approach to treatment initiation, clinicians aim to mitigate irreversible joint damage and disability associated with delayed therapy escalation.^{47,71–73}

Another crucial factor to consider is the judicious selection and sequencing of biologic therapies.⁷⁴ The treat-to-target approach in SpA may come with significant cost implications, as early use of bDMARDs increases medical costs and overall treatment burden, particularly in India where a national insurance system is absent.^{54,75,76} Adjustments to the top-down approach aimed to ease the cost burden include administration of shorter courses of bDMARDs followed by continued csDMARDs to sustain efficacy,⁵⁴ or early use of targeted synthetic DMARDs (tofacitinib), a popular strategy in various treatment centers and standalone clinics in India. Decisions on early escalation of therapy may also be influenced by the increased susceptibility of Asian patients to opportunistic infections, tuberculosis, and herpes zoster.^{54,77,78}

Overall, treat-to-target is an expedited and personalized treatment approach guided by disease severity, prognostic indicators, patient preference, and individual risk factors. As such, it represents a significant advancement in the management of SpA, offering bioeligible patients the opportunity for earlier symptom relief, improved functional outcomes, and enhanced long-term prognosis.

Utilization of Biologic Therapies in Rheumatological Indications in India

The rate of acceptance and utilization of biologic therapy in India for rheumatological conditions is growing, albeit with certain challenges and limitations.^{11,77,79–81} Studies of bDMARDs in bioeligible patients with SpA from India have reported efficacy and safety results consistent with those seen in other regions. In a real-world study, 90% of patients with axSpA attained BASDAI-50 improvement, and 76% had Ankylosing Spondylitis Disease Activity Score (ASDAS) improvement with secukinumab (IL-17A inhibitor) treatment.⁸² In more recent studies, TNF- α inhibitors, such as golimumab, have shown meaningful improvements in ASDAS-CRP, the ASAS20 criteria, and the American College of Rheumatology 20 (ACR20) responses with an acceptable safety profile in bio-eligible patients with SpA from India.^{83,84}

The lack of affordable screening tools, such as MRI for early detection of structural damage and genetic testing, hampers effective SpA management in some rural settings within India.^{29,85} Despite clinical evidence supporting their efficacy and safety, the use of biologics in India is restricted by several factors (Table 2). These include limited affordability, poor availability, maintenance, and safety in certain rural healthcare settings, which in turn exacerbate healthcare disparities between urban and rural areas.^{29,76,86} Additionally, the absence of an India-specific biologic initiation protocol for rheumatologists, dermatologists, and orthopedists managing bio-eligible SpA patients contributes to inconsistent treatment practices.

Insurance coverage also plays a critical role in limiting access to biologic therapies. In a survey-based study of rheumatologists from India, financial constraints were the primary reason for delayed initiation and early cessation of biologic therapies.²⁹ A general lack of awareness among healthcare providers and patients in India about the benefits and the appropriate use of biologics can lead to their underutilization. Additionally, many insurance providers in India do not cover subcutaneous biologic therapies, creating barriers for patients who could benefit from these treatments. As medical science evolves, therapies are becoming less invasive, and biologic therapies, irrespective of their route of administration, should be reimbursed to ensure equitable access for all patients. Safety concerns, particularly regarding the risk of infections such as tuberculosis and herpes zoster, are greater in India, where these conditions are endemic, necessitating intensive screening and monitoring.^{77,78,87} Furthermore, challenges related to infrastructure and

Table 2: Barriers to implementation of biologic therapies for SpA in India

Category	Barriers and challenges
Economic barriers	High out-of-pocket costs: Biologic therapies are largely unaffordable for most Indian patients due to limited government funding and subsidies Limited insurance coverage: Minimal private insurance and public schemes often exclude or restrict access to advanced therapies such as biologics
Healthcare system and accessibility barriers	Scarcity of rheumatologists: India faces a significant shortage of rheumatologists, with rural and semiurban areas being the most affected Infrastructure constraints: Many healthcare facilities in tier-2 and tier-3 cities lack essential resources like imaging and laboratory services required for biologic therapies Limited specialty clinics: Dedicated rheumatology or SpA clinics are rare outside metropolitan areas, forcing patients to travel long distances for specialized care
Regulatory and supply barriers	Regulatory delays: Delays in approval processes limit timely access to new biologics Supply chain challenges: Maintaining the cold chain for biologics is difficult in many parts of India due to inadequate infrastructure and frequent power outages
Physician-related barriers	Lack of training: Many Indian clinicians are not adequately trained in biologic use, leading to underutilization or improper administration Safety concerns: Physicians express concern about the long-term safety of biologics, due to lack of country-specific data for Indian patients Cost-effectiveness concerns: Physicians may avoid prescribing biologics due to affordability issues for patients
Patient-related barriers	Challenges in patient selection: Without advanced diagnostic tools like genetic profiling or biomarkers, selecting appropriate candidates for biologics is difficult Cultural misconceptions: Biologics are often misunderstood as “experimental” or “last-resort” treatments, delaying acceptance among Indian patients Fear of side effects: Concerns about adverse effects, often amplified by misinformation, deter many patients from starting biologic therapy Preference for alternative medicine: A significant portion of Indian patients rely on traditional medicine (Ayurveda, homeopathy), delaying initiation of evidence-based treatments Adherence issues: Complex treatment regimens and travel requirements for regular follow-ups make adherence particularly challenging for rural patients
Patient education and knowledge barriers	Limited patient education: Many patients, especially in rural areas, lack basic knowledge about SpA and its treatment options Lack of patient education programs in regional languages may also impact poor understanding of biologic therapies among the diverse patient populations Few support programs: Patient support programs for financial aid, education, or psychosocial counseling are limited or unavailable in most parts of India
Monitoring and follow-up barriers	Inconsistent monitoring: Many Indian healthcare facilities lack structured systems for consistent follow-up and monitoring of biologic therapies Cost of monitoring tests: Routine tests like liver function tests and imaging are often unaffordable for patients, leading to gaps in monitoring and treatment continuity Need for specialized testing: Patients in smaller towns or rural areas often have to travel significant distances for specialized monitoring, creating additional barriers Lack of integrated patient tracking systems: Fragmented record-keeping and lack of patient tracking prevent efficient follow-up and long-term outcome monitoring
Psychosocial and socioeconomic barriers	Impact of socioeconomic status: Patients from lower socioeconomic groups face greater challenges in affording and accessing biologic therapies, even with financial assistance. Stigma and mental health impact: The chronic nature of SpA, coupled with the clinical setting required for biologic administration, can exacerbate feelings of dependence, illness stigma, and emotional distress

SpA, Spondyloarthritis

logistics, including storage, transportation, and administration requirements, as well as regulatory hurdles and bureaucratic processes, contribute to delays in accessing treatment. Lastly, ensuring the long-term sustainability of biologic therapy, given the high costs and chronic nature of rheumatological conditions, raises questions about treatment adherence

and outcomes. This necessitates innovative approaches by healthcare providers, such as continuing biologics at a reduced dose or frequency after achieving remission. To enhance the accessibility and utilization of biologic therapies in India, efforts must focus on improving affordability, reducing regulatory ambiguity, strengthening healthcare

infrastructure, and exploring the efficacy of newer, more targeted therapies.^{88,89}

LIMITATIONS

Although detailed perspectives were collected in this review, it should be noted that this nonsystematic review was conducted

Table 3: Strategies to improve utilization of biologics in India

Strategy	Key actions
Enhancing diagnostic yield and reducing delays in SpA detection	Raising awareness of SpA among family physicians Enhancing access to MRI Optimizing early diagnosis of nonradiographic forms of SpA, which often experience the most delays Integrating rheumatology services into the primary care setting and promoting multidisciplinary collaborations
Educational and clinical development initiatives	Organizing national and regional workshops for rheumatologists, orthopedic surgeons, and internists Developing and disseminating case-based learning modules and specialty-specific CME programs Deploying digital clinical decision support tools, including digital applications and checklists
Identifying markers for rapid disease progression	Researching and identification of specific markers in Indian patients that will predict those at risk of rapid disease progression Evaluating the genetic (<i>HLA-B27</i> testing) and immunological underpinnings of SpA in Indian patients
Data generation and real-world evidence (RWE)	Conducting phase IV studies and health economics and outcomes research analyses to assess the cost-effectiveness of biologics in India Establishing a national patient registry for SpA to collect long-term data on biologic outcomes, adverse events, and patient-reported outcomes
Enhancing radiographic monitoring and training programs for primary care physicians and specialists (orthopedic surgeons, dermatologists)	Leveraging radiographic modalities for disease monitoring and providing radiology training to physicians Providing radiology training programs tailored to SpA for general physicians, orthopedics, and dermatologists Supporting the identification of disease manifestations specific to the Indian population, promoting early biologic initiation and intervention strategies
Adopting a top-down and treat-to-target approach	Implementing a top-down approach to prioritize early adoption of bDMARDs Promoting a treat-to-target strategy
Raising awareness among Indian healthcare providers	Educating primary care providers, orthopedic surgeons, and dermatologists about therapy escalation strategies and the appropriate use of biologics
Developing India-specific Protocols for Initiation of Biologics	Creating protocols tailored to the Indian population to ensure effective and safe use of biologics Clinical screening for active tuberculosis infection with '4S complex' and standard chest radiograph, augmented Mantoux testing simultaneously with QuantiFERON®-TB Gold test among patients treated with bDMARDs Involving patient advocacy groups, healthcare providers, policymakers, and pharmaceutical companies in the development of new and effective protocols
Ensuring availability of biologic treatments in reimbursed segments	Expanding reimbursement coverage for biologics, including subcutaneous formulations, to address patient diversity in treatment needs Including biologics in reimbursement schemes across sectors such as the Central Government Health Scheme (CGHS), Employees' State Insurance Scheme (ESIC), and state hospitals, etc. Advocating reimbursement for biologic therapies through collaborative efforts involving industry and rheumatology associations
Improving access, affordability, and support systems	Engaging with third-party payers to demonstrate long-term savings from biologic use through reduced hospitalizations and disability Exploring public-private partnerships to subsidize biologic therapies for low-income populations Establishing patient assistance programs with tiered subsidies based on income
Patient-centric engagement and adherence support	Organizing patient awareness campaigns on biologic therapy benefits, adherence, and side-effect management Partnering with advocacy groups to create support networks where patients share experiences Utilizing telemedicine and mobile health tools (e.g., apps, SMS reminders) to track adherence and provide continuous patient support
Monitoring and feedback mechanisms	Setting up post-marketing surveillance systems to monitor adverse effects and collect long-term data on efficacy of biologic therapies Using patient feedback surveys to improve treatment protocols and ensure better alignment with patient needs
Interdisciplinary collaboration and networking	Facilitating cross-disciplinary collaborations between rheumatologists, dermatologists, and orthopedists for comprehensive SpA care Establishing mentorship programs where experienced clinicians guide peers on biologic therapy initiation and post-treatment management

4S complex is a screening tool used to identify people who may have tuberculosis and consists of four symptoms: cough, fever, night sweats, and weight loss. bDMARD, biologic disease-modifying antirheumatic drugs; CME, continuing medical education; MRI, magnetic resonance imaging; SpA, spondyloarthritis; TB, tuberculosis

with a small and nonrandom expert pool from India. In addition, we cannot rule out potential bias from self-reported perspectives that were integrated into this article.

STRATEGIES TO IMPROVE UTILIZATION OF BIOLOGICS IN INDIA: EXPERT OPINION

Improving the availability, access, and utilization of biologic therapies in India requires a multimodal and comprehensive approach, involving several stakeholder groups. Patients and advocacy groups play a pivotal role in raising awareness about the benefits of biologics and advocating for equitable access. Clinicians and physician societies must drive education, training, and the adoption of evidence-based protocols to ensure appropriate patient selection and treatment. Health regulatory authorities and insurance providers need to address barriers such as affordability and insurance coverage limitations, and streamline approval processes to expand accessibility. Additionally, there is a critical need for sensitive and affordable disease markers to aid early and accurate diagnosis, enabling timely intervention as well as detection of structural damage and disease progression. Pharmaceutical companies must also focus on affordability, supply chains, and patient support programs to enhance availability and adherence. Together, these collaborative efforts are essential to bridge the gap between availability and optimal use of biologic therapies as well as improve outcomes for bio-eligible patients with chronic, debilitating SpA in India (Table 3).

CONCLUSION

Although treat-to-target is the recommended approach in SpA, its adoption in Indian clinical practice is suboptimal due to several socioeconomic constraints. Expanding the biologic therapy space in India will necessitate a multipronged approach to overcome long-standing barriers. Strengthening diagnostic capabilities with more affordable MRIs and access to genetic testing can support earlier identification and risk stratification, which, when combined with clinical assessment, may facilitate timely intervention and more effective disease management. A unified effort among key stakeholders is required, with healthcare providers prioritizing standardized treatment protocols and training programs to improve treatment, and participation by nonrheumatologists and referring physicians. Along with integrating rheumatology care in public insurance schemes, broader insurance coverage for biologics and streamlined

regulatory pathways are essential to reduce financial and logistical barriers. Industry-led initiatives to improve affordability, create patient assistance programs, and ensure uninterrupted biologic/biosimilar supply chains can further support access. Continuous training for primary physicians on structured referral pathways is needed to ensure patients receive the best possible care. By fostering collaboration between clinicians, regulatory authorities, patient advocacy groups, and pharmaceutical companies, India can advance the adoption of biologics and improve outcomes for bio-eligible patients with SpA. We acknowledge that some progress has been made—such as the expansion of MRI services, provision of free biologics in select public-sector programs, and the growing involvement of nonspecialist physicians in early identification. However, further systemic changes are needed to meet the ever-increasing demands of India's 1.4 billion population. These insights and recommendations are based on current evidence and expert clinical perspectives, acknowledging regional variations in practice patterns and recognizing that India's healthcare landscape is dynamic and continually evolving.

ACKNOWLEDGMENTS

The authors thank Priya Ganpathy, MPH, CMPP (SIRO Clinpharm UK Limited), for medical writing assistance and Sangita Patil, PhD, CMPP (SIRO Medical Writing Pvt. Ltd., India), for additional editorial support. The authors also thank Dr Rachana Acharya for her contributions to the study.

ETHICAL APPROVAL

Ethical permission was not applicable for this article, as this is a review article drafted from various literature sources and not from patients directly.

INFORMED CONSENT

Consent was not applicable, as this is a review article compiled from various literature sources and guidelines and not from patients directly.

SOURCE OF SUPPORT

This research was supported by Johnson and Johnson Pvt. Ltd., India.

CONFLICT OF INTEREST

Rohini Handa has served/serves as speaker, consultant, and advisory board member for Abbott India, Pfizer, IPCA, GSK, Dr Reddy's

Laboratories Ltd., Janssen, Roche, Sanofi, Eli Lilly, Emcure, Zydus, Novartis, and Alkem. Sundeep Upadhyaya serves on the advisory board and speaker's bureau and receives travel and scientific meeting expenses from Cipla, Eli Lilly, IPCA, Johnson and Johnson, Novartis, Pfizer, Roche, Torrent, and Zydus. Shashank M Akerkar serves on the speaker's bureau for Pfizer, Novartis, Eli Lilly, and Janssen. Sagar Panchal is an employee of Johnson and Johnson Pvt. Ltd., India, and may own stock or stock options in Johnson and Johnson. Other authors have no financial conflicts of interest to disclose.

DATA AVAILABILITY

No new data were generated or analyzed in support of this research.

AUTHOR CONTRIBUTIONS

All authors made a significant contribution to the work reported, took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

ORCID

Shashank M Akerkar  <https://orcid.org/0009-0002-3194-9641>

REFERENCES

1. Al Rayes H, Salah H, Hamad T, et al. The impact of spondyloarthritis on health-related quality of life and healthcare resource utilization in Saudi Arabia: a narrative review and directions for future research. *Open Access Rheumatol* 2023;15:161–171.
2. Ramonda R, Marchesoni A, Carletto A, et al. Patient-reported impact of spondyloarthritis on work disability and working life: the ATLANTIS survey. *Arthritis Res Ther* 2016;18:78.
3. Yi E, Ahuja A, Rajput T, et al. Clinical, economic, and humanistic burden associated with delayed diagnosis of axial spondyloarthritis: a systematic review. *Rheumatol Ther* 2020;7(1):65–87.
4. Khan MA. Update on spondyloarthropathies. *Ann Intern Med* 2002;136(12):896–907.
5. Redeker I, Siegmund B, Ghoreschi K, et al. The impact of extra-musculoskeletal manifestations on disease activity, functional status, and treatment patterns in patients with axial spondyloarthritis: results from a nationwide population-based study. *Ther Adv Musculoskelet Dis* 2020;12:1759720X20972610.
6. Liao HT, Tsai CY, Lai CC, et al. The potential role of genetics, environmental factors, and gut dysbiosis in the aberrant non-coding RNA expression to mediate inflammation and osteoclastogenic/osteogenic differentiation in ankylosing spondylitis. *Front Cell Dev Biol* 2021;9:748063.
7. Said-Nahal R, Miceli-Richard C, Gautreau C, et al. The role of HLA genes in familial spondyloarthropathy: a comprehensive study of 70 multiplex families. *Ann Rheum Dis* 2002;61(3):201–206.
8. Drosos AA, Venetsanopoulou AI, Voulgari PV. Axial spondyloarthritis: evolving concepts regarding the disease's diagnosis and treatment. *Eur J Intern Med* 2023;117:21–27.

9. van Tubergen A. The changing clinical picture and epidemiology of spondyloarthritis. *Nat Rev Rheumatol* 2015;11(2):110–118.
10. Edara M, Bhatt V, Zanwar A, et al. A study of clinical, radiological features and HLA-B27 serology of axial spondyloarthropathy with comparison of radiographic and non-radiographic disease. *J Family Med Prim Care* 2022;11(8):4417–4423.
11. Malaviya AN. Spondyloarthritis in India. *Indian J Rheumatol* 2020;15(Suppl 1):S2–S5.
12. Jayaprakash T, Muthamilan O, Leela K, et al. Association of genetic marker HLA-B27 with spondyloarthritis in a tertiary care centre in South India. *J Pure Appl Microbiol* 2022;16(2):901–908.
13. Chopra A, Ghorpade R, Saluja M, et al. AB1286 Ankylosing spondylitis (AS), psoriatic arthritis, undifferentiated (U) spondyloarthritis (SPA) in India: results from WHO ILAR COPCORD India program stage I survey 2000–2010. *Ann Rheum Dis* 2018;77(Suppl 2):1735.3–1736.
14. Malakar A, Kakati S, Barman B, et al. Clinical presentation and subtypes of spondyloarthritis patients in North East India. *Egypt Rheumatol* 2020;42(4):271–274.
15. Chopra A, Patil J, Billempelly V, et al. Prevalence of rheumatic diseases in a rural population in western India: a WHO-ILAR COPCORD study. *J Assoc Physicians India* 2001;49:240–246.
16. Joshi VL, Chopra A. Is there an urban–rural divide? Population surveys of rheumatic musculoskeletal disorders in the Pune region of India using the COPCORD Bhigwan model. *J Rheumatol* 2009;36(3):614–622.
17. Kumar R, Sharma A, Dogra S. Prevalence and clinical patterns of psoriatic arthritis in Indian patients with psoriasis. *Indian J Dermatol Venereol Leprol* 2014;80(1):15–23.
18. Rudwaleit M, Landewé R, van der Heijde D, et al. The Development of Assessment of SpondyloArthritis international Society classification criteria for axial spondyloarthritis (part I): classification of paper patients by expert opinion including uncertainty appraisal. *Ann Rheum Dis* 2009;68(6):770–776.
19. Sieper J, Rudwaleit M, Baraliakos X, et al. The Assessment of SpondyloArthritis international Society handbook: a guide to assess spondyloarthritis. *Ann Rheum Dis* 2009;68(Suppl 2):ii1–ii44.
20. Stolwijk C, van Onna M, Boonen A, et al. Global prevalence of spondyloarthritis: a systematic review and meta-regression analysis. *Arthritis Care Res (Hoboken)* 2016;68(9):1320–1331.
21. Reddy K, Raut A, Patil P. Axial spondyloarthritis in India: determining the delay in diagnosis, impact on work productivity, and attitude of patients toward treatment. *Indian J Rheumatol* 2020;15(4):267–274.
22. Tillett W, de Vries C, McHugh NJ. Work disability in psoriatic arthritis: a systematic review. *Rheumatology (Oxford)* 2012;51(2):275–283.
23. McDonough E, Ayeart R, Eder L, et al. Depression and anxiety in psoriatic disease: prevalence and associated factors. *J Rheumatol* 2014;41(5):887–896.
24. Frede N, Hiestand S, Schauer F, et al. Psoriasis and psoriatic arthritis have a major impact on quality of life and depressive symptoms: a cross-sectional study of 300 patients. *Rheumatol Ther* 2023;10(6):1655–1668.
25. Ramiro S, Nikiphorou E, Sepriano A, et al. ASAS-EULAR recommendations for the management of axial spondyloarthritis: 2022 update. *Ann Rheum Dis* 2023;82(1):19–34.
26. Chandrashekar S, Shenoy P, Kumar U, et al. Delay in referral to specialty care in patients with spondyloarthropathy and psoriatic arthritis in India: IRA database report. *Indian J Rheumatol* 2024;19(1):41–46.
27. Aggarwal R, Malaviya AN. Diagnosis delay in patients with ankylosing spondylitis: factors and outcomes—an Indian perspective. *Clin Rheumatol* 2009;28(3):327–331.
28. Malaviya A, Kumar A. Axial spondyloarthritis in India. In: Inman RD, Sieper J (Eds). *Oxford Textbook of Axial Spondyloarthritis*. Oxford: Oxford University Press; 2016. pp. 285–298.
29. Pathak H, Ajmani S, Kumar A, et al. Services provided for axial spondyloarthritis patients by rheumatologists in India: a survey. *Rheumatol Adv Pract* 2021;5(2):rkab048.
30. Coates LC, Soriano ER, Corp N, et al. Group for Research and Assessment of Psoriasis and Psoriatic Arthritis: updated treatment recommendations for psoriatic arthritis 2021. *Nat Rev Rheumatol* 2022;18(8):465–479.
31. López-Medina C, Ramiro S, van der Heijde D, et al. Characteristics and burden of disease in patients with radiographic and non-radiographic axial spondyloarthritis: a comparison by systematic literature review and meta-analysis. *RMD Open* 2019;5(2):e001108.
32. Kishimoto M, Ono K, Fukui S, et al. Clinical characteristics of non-radiographic versus radiographic axial spondyloarthritis in Asia and non-radiographic axial spondyloarthritis in other regions: results of the cross-sectional ASAS-COMOSPA study. *RMD Open* 2021;7(3):e001752.
33. Malaviya AN, Kalyani A, Rawat R, et al. Comparison of patients with ankylosing spondylitis and non-radiographic axial spondyloarthritis from a single rheumatology clinic in New Delhi. *Int J Rheum Dis* 2015;18(7):736–741.
34. Gavali M, Konda K, Rajasekhar L, et al. A comparison of clinical and laboratory profile of non-radiographic axial spondyloarthritis and ankylosing spondylitis. *Indian J Rheumatol* 2015;10(3):129–132.
35. Micheroli R, Kissling S, Bürki K, et al. Sacroiliac joint radiographic progression in axial spondyloarthritis is retarded by the therapeutic use of TNF inhibitors: 12-year data from the SCQM registry. *RMD Open* 2022;8(2):e002551.
36. Drouet JMS, Gossec L. Work-related issues and a high burden of disease are frequent in axial spondyloarthritis: what should we be doing better? *J Rheumatol* 2023;50(5):581–582.
37. López-Medina C, Moltó A. Comorbidity management in spondyloarthritis. *RMD Open* 2020;6(2):e001135.
38. López-Medina C, Moltó A. Update on the epidemiology, risk factors, and disease outcomes of axial spondyloarthritis. *Best Pract Res Clin Rheumatol* 2018;32(2):241–253.
39. Chyuan IT, Chen JY. Role of interleukin-17 in the pathogenesis and targeted therapies in spondyloarthropathies. *Mediators Inflamm* 2018;2018:2403935.
40. Chandrashekar S, Shenoy P, Kumar U, et al. Burden of associated comorbidities in autoimmune rheumatic diseases in the Indian population: an interim report based on the Indian Rheumatology Association database. *Indian J Rheumatol* 2022;17(3):227–233.
41. Varkas G, Jans L, Cyphers H, et al. Brief report: six-week treatment of axial spondyloarthritis patients with an optimal dose of nonsteroidal anti-inflammatory drugs: early response to treatment in signal intensity on magnetic resonance imaging of the sacroiliac joints. *Arthritis Rheumatol* 2016;68(3):672–678.
42. Zhang JR, Pang DD, Dai SM. Nonsteroidal anti-inflammatory drugs are unlikely to inhibit radiographic progression of ankylosing spondylitis: a systematic review. *Front Med (Lausanne)* 2019;6:214.
43. Kroon F, Landewé R, Dougados M, et al. Continuous NSAID use reverts the effects of inflammation on radiographic progression in patients with ankylosing spondylitis. *Ann Rheum Dis* 2012;71(10):1623–1629.
44. Poddubnyy D, Rudwaleit M, Haibel H, et al. Effect of nonsteroidal anti-inflammatory drugs on radiographic spinal progression in patients with axial spondyloarthritis: results from the German Spondyloarthritis Inception Cohort. *Ann Rheum Dis* 2012;71(10):1616–1622.
45. Bindu S, Mazumder S, Bandyopadhyay U. Nonsteroidal anti-inflammatory drugs and organ damage: a current perspective. *Biochem Pharmacol* 2020;180:114147.
46. Baraliakos X, Kiltz U, Peters S, et al. Efficiency of treatment with nonsteroidal anti-inflammatory drugs according to current recommendations in patients with radiographic and non-radiographic axial spondyloarthritis. *Rheumatology (Oxford)* 2017;56(1):95–102.
47. Sieper J, Lenaerts J, Wollenhaupt J, et al. Efficacy and safety of infliximab plus naproxen versus naproxen alone in patients with early, active axial spondyloarthritis: results from the double-blind, placebo-controlled INFAST study, part 1. *Ann Rheum Dis* 2014;73(1):101–107.
48. Braun J, Zochling J, Baraliakos X, et al. Efficacy of sulfasalazine in patients with inflammatory back pain due to undifferentiated spondyloarthritis and early ankylosing spondylitis: a multicentre randomised controlled trial. *Ann Rheum Dis* 2006;65(9):1147–1153.
49. Haibel H, Brandt HC, Song IH, et al. No efficacy of subcutaneous methotrexate in active ankylosing spondylitis: a 16-week open-label trial. *Ann Rheum Dis* 2007;66(3):419–421.
50. Chen J, Lin S, Liu C. Sulfasalazine for ankylosing spondylitis. *Cochrane Database Syst Rev* 2014;2014(11):CD004800.
51. Singhal A, Bhakuni D, Marwaha V, et al. Biologics use in Asian Indian patients with ankylosing spondylitis: a physician's perspective. *J Clin Diagn Res* 2016;10(7):OC29–OC32.
52. Li S, Li F, Mao N, et al. Efficacy and safety of Janus kinase inhibitors in patients with ankylosing spondylitis: a systematic review and meta-analysis. *Eur J Intern Med* 2022;102:47–53.
53. Ganapati A, Gowri M, Antonisamy B, et al. Combination of methotrexate and sulfasalazine is an efficacious option for axial spondyloarthritis in a resource-limited, real-world clinical setting: a prospective cohort study. *Clin Rheumatol* 2021;40(5):1871–1879.
54. Nair AM, Sandhya P, Yadav B, et al. TNF- α blockers followed by continuation of sulfasalazine and methotrexate combination: a retrospective study on cost-saving options of treatment in spondyloarthritis. *Clin Rheumatol* 2017;36(10):2243–2251.
55. Zhao SS, Harrison SR, Thompson B, et al. The 2025 British Society for Rheumatology guideline for the treatment of axial spondyloarthritis with biologic and targeted synthetic DMARDs. *Rheumatology (Oxford)* 2025;64(6):3242–3254.
56. Traves PG, Murray B, Campigotto F, et al. JAK selectivity and the implications for clinical inhibition of pharmacodynamic cytokine signalling by filgotinib, upadacitinib, tofacitinib and baricitinib. *Ann Rheum Dis* 2021;80(7):865–875.
57. White JPE, Coates LC. JAK1-selective inhibitors for the treatment of spondyloarthropathies. *Rheumatology (Oxford)* 2021;60(Suppl 2):ii39–ii44.
58. Ahmed S, Yesudian R, Ubaide H, et al. Rationale and concerns for using JAK inhibitors in axial spondyloarthritis. *Rheumatol Adv Pract* 2024;8(4):rkae141.
59. Movahedi M, Cesta A, Li X, et al. OP0211: Time to discontinuation of tofacitinib and TNF inhibitors in rheumatoid arthritis patients with and without methotrexate: data from a rheumatoid arthritis cohort. *Ann Rheum Dis* 2020;79(Suppl 1):131.2–132.
60. Bertoldi I, Caporali R. Tofacitinib: real-world data and treatment persistence in rheumatoid arthritis. *Open Access Rheumatol* 2021;13:221–237.
61. Ytterberg SR, Bhatt DL, Mikuls TR, et al. Cardiovascular and cancer risk with tofacitinib in rheumatoid arthritis. *N Engl J Med* 2022;386(4):316–326.
62. Xu Q, He L, Yin Y. Risk of herpes zoster associated with JAK inhibitors in immune-mediated inflammatory diseases: a systematic review and network meta-analysis. *Front Pharmacol* 2023;14:1241954.
63. Caso F, Costa L, Del Puente A, et al. Pharmacological treatment of spondyloarthritis: exploring the effectiveness of nonsteroidal anti-inflammatory drugs, traditional disease-modifying antirheumatic drugs and biological therapies. *Ther Adv Chronic Dis* 2015;6(6):328–338.
64. Danve A, Deodhar A. Treatment of axial spondyloarthritis: an update. *Nat Rev Rheumatol* 2022;18(4):205–216.

65. Machado PM, Deodhar A. Treat-to-target in axial spondyloarthritis: gold standard or fool's gold? *Curr Opin Rheumatol* 2019;31(4):344–348.
66. Ward MM, Deodhar A, Gensler LS, et al. 2019 update of the American College of Rheumatology/Spondylitis Association of America/Spondyloarthritis Research and Treatment Network recommendations for the treatment of ankylosing spondylitis and non-radiographic axial spondyloarthritis. *Arthritis Care Res (Hoboken)* 2019;71(10):1285–1299.
67. Cheng I, So H, Leung Y, et al. AB0761: Are we treating to target in spondyloarthritis? A cross-sectional analysis from the Asia Pacific League of Associations for Rheumatology Spondyloarthritis Registry. *Ann Rheum Dis* 2022;81(Suppl 1):1506–1507.
68. Baraliakos X, Braun J, Deodhar A, et al. Long-term efficacy and safety of secukinumab 150 mg in ankylosing spondylitis: 5-year results from the phase III MEASURE 1 extension study. *RMD Open* 2019;5(2):e001005.
69. Braun J, Baraliakos X, Deodhar A, et al. Effect of secukinumab on clinical and radiographic outcomes in ankylosing spondylitis: 2-year results from the randomised phase III MEASURE 1 study. *Ann Rheum Dis* 2017;76(6):1070–1077.
70. Deodhar A, Gensler LS, Sieper J, et al. Three multicenter, randomized, double-blind, placebo-controlled studies evaluating the efficacy and safety of ustekinumab in axial spondyloarthritis. *Arthritis Rheumatol* 2019;71(2):258–270.
71. Deodhar A, Poddubnyy D, Pacheco-Tena C, et al. Efficacy and safety of ixekizumab in the treatment of radiographic axial spondyloarthritis: sixteen-week results from a phase III randomized, double-blind, placebo-controlled trial in patients with prior inadequate response to or intolerance of tumor necrosis factor inhibitors. *Arthritis Rheumatol* 2019;71(4):599–611.
72. Haroon N, Inman RD, Learch TJ, et al. The impact of tumor necrosis factor- α inhibitors on radiographic progression in ankylosing spondylitis. *Arthritis Rheum* 2013;65(10):2645–2654.
73. Abedalweli R, Nguyen M, Deodhar A. Combination biologics or targeted synthetic disease-modifying antirheumatic drugs in the treatment of spondyloarthritis: a systematic literature review. *Expert Rev Clin Immunol* 2024;20(7):735–743.
74. Cantini F, Niccoli L, Nannini C, et al. Tailored first-line biologic therapy in patients with rheumatoid arthritis, spondyloarthritis, and psoriatic arthritis. *Semin Arthritis Rheum* 2016;45(5):519–532.
75. Kumar AK, Chen LC, Choudhury M, et al. Financing health care for all: challenges and opportunities. *Lancet* 2011;377(9766):668–679.
76. Dharmanand BG, Oak J, Upadhyaya SK, et al. A consensus report by the RAPID-India Group on optimising adalimumab treatment for Indian patients with rheumatoid arthritis, axial spondyloarthritis and psoriaticarthritis. *Indian J Rheumatol* 2025;20(4):378–391.
77. Shobha V, Chandrashekar S, Rao V, et al. Biologics and risk of tuberculosis in autoimmune rheumatic diseases: a real-world clinical experience from India. *Int J Rheum Dis* 2019;22(2):280–287.
78. Upadhyaya SK. Antibodies to tumor necrosis factors in the treatment of rheumatoid arthritis and spondyloarthritis: the basic science, clinical science and unmet needs; results from a single center. *Open J Rheumatol Autoimmune Dis* 2014;4(2):86–92.
79. Chopra A, Shobha V, Chandrashekar S, et al. Tofacitinib in the treatment of Indian patients with rheumatoid arthritis: a post hoc analysis of efficacy and safety in phase 3 and long-term extension studies over 7 years. *Int J Rheum Dis* 2020;23(7):882–897.
80. Chopra A, Subramanian S. Biosimilar DMARD in rheumatology: a general perspective with focus on India. *Indian J Rheumatol* 2012;7(2):89–96.
81. Misra DP, Ravindran V, Sharma A, et al. Rheumatology practice and training in India—a perspective from rheumatology consultants. *Indian J Rheumatol* 2020;15(2):92–99.
82. Sham S, Hema M, Thilagavathy N, et al. Effectiveness and safety of secukinumab in axial spondyloarthritis and psoriatic arthritis: a retrospective analysis of its real-world usage from India. *Indian J Rheumatol* 2020;15(4):261–266.
83. Upadhyaya S, Kumar U, Chandrashekar S, et al. Safety and efficacy of golimumab in Indian patients with active spondyloarthritis of ankylosing spondylitis or psoriatic arthritis: a multicenter, noncomparative, open-label, real-world study. *J Assoc Physicians India* 2024;72(3):40–46.
84. Pandey BD, Krishnamurthy V, Kumar U, et al. Safety and efficacy of golimumab in rheumatoid arthritis: a prospective, multicenter, real-world study from India. *Indian J Rheumatol* 2023;18(4):282–288.
85. Hilabi BS, Alghamdi SA, Almana M. Impact of magnetic resonance imaging on healthcare in low- and middle-income countries. *Cureus* 2023;15(4):e37698.
86. Shinde VA, Patil R, Bhandari P, et al. A pharmacoeconomic outlook of the biological drugs marketed in India: a cost variance analysis. *Cureus* 2023;15(1):e33943.
87. Handa R, Upadhyaya S, Kapoor S, et al. Tuberculosis and biologics in rheumatology: a special situation. *Int J Rheum Dis* 2017;20(10):1313–1325.
88. Klavdianou K, Papagoras C, Baraliakos X. JAK inhibitors for the treatment of axial spondyloarthritis. *Mediterr J Rheumatol* 2023;34(2):129–138.
89. van der Heijde D, Baraliakos X, Sieper J, et al. Efficacy and safety of upadacitinib for active ankylosing spondylitis refractory to biological therapy: a double-blind, randomised, placebo-controlled phase 3 trial. *Ann Rheum Dis* 2022;81(11):1515–1523.