Review Article

A Comprehensive Review on Juvenile Idiopathic Arthritis and Recent Clinical Advances

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ABSTRACT

Juvenile idiopathic arthritis (JIA) is a chronic disease characterized by prolonged synovial inflammation that can cause structural damage to the joints. JIA includes all forms of chronic childhood arthritis, which affect not only the joints, but also extra-articular structures, including the eyes, skin and internal organs, leading to associated disability and also the death Juvenile idiopathic arthritis (JIA) is defined by the International League of Societies of Rheumatology (ILAR) as arthritis of unknown etiology, which begins before the sixteenth birthday, lasts more than six weeks, excluding all other diagnoses. The management of JIA Involves a multidisciplinary approach, an Important goal of the management of JIA is to promote the normal psychosocial and social development of the child and to face the possible difficulties caused by the disease or its consequences in family life. Therapeutic intervention begins at diagnosis with nonsteroidal anti-inflammatory drugs (NSAIDs) followed by disease-modifying antirheumatic drugs (DMARDs, most commonly methotrexate) and/or intra-articular corticosteroid injections. Other considerations are sulfasalazine and leflunomide. Sulfasalazine is effective against peripheral joint arthritis in enthesitis-related arthritis.

Keywords: Juvenile idiopathic arthritis, joints, pediatric, psychosocial, human leucocytic agent.

INTRODUCTION

Juvenile idiopathic arthritis (JIA) is defined by the International League of Societies of Rheumatology (ILAR) as arthritis of unknown etiology, which begins before the sixteenth birthday, lasts more than six weeks, excluding all other diagnoses. Arthritis itself is defined as swelling or suppuration, increased heat, and/or painful limitation of movement with or without tenderness. [1]

Juvenile idiopathic arthritis (JIA) is a chronic disease characterized by prolonged synovial inflammation that can cause structural damage to the joints. JIA includes all forms of chronic childhood arthritis, which affect not only the joints, but also extra-articular structures, including the eyes, skin and internal organs, leading to associated disability and also the death Irreversible abnormalities may also occur in extra-articular organs, such as the eye (complication of iridocyclitis) or kidney (due to systemic amyloidosis), or may result from the adverse effects of drug therapies.

This morbidity can affect the quality of life of patients and their families. The goals of JIA management are to improve patient symptoms and improve inflammatory manifestations to improve health-related quality of life (HRQoL) and prevent irreversible damage. [2,3]

The diagnosis of JIA includes distinct subclassifications, defined by the ILAR in 2001 to include systemic arthritis, Oligoarthritis, rheumatoid factor-positive polyarthritis, rheumatoid factor-negative polyarthritis, psoriatic arthritis, enthesitis, arthritis and non-rheumatoid arthritis.

This classification system has been criticized since there is growing evidence that some of these categories are more heterogeneous and could be defined more precisely by a new system.

In 2019, the International Pediatric Rheumatology Trials Organization (PRINTO) began the validation process of a new classification system.[1] The main criteria for the disease are the onset of the disease before the age of 16 years and arthritis of at least one joint that persists for more than 6 weeks, excluding any other possible cause of joint inflammation.

The subtype of the disease must be evaluated at the beginning of the disease and during follow-up. The initial classification is made on the basis of the clinical characteristics of the first six months of the course of the disease. The appearance of new clinical features during the course of the disease defines the final subtype of the disease.

The main objective of the subclassification of the disease is the homogenization of the groups of diseases, the definition of therapeutic options, the choice of monitoring strategies and the prediction of the prognosis of the disease. [4]

Sub-classifications of Juvenile idiopathic arthritis according to the International League of Associations for Rheumatology revised criteria [5]

Sub classification		Definition	Exclusion
Systemic arthritis		Arthritis in one or more joints that is accompanied by one or more of the following symptoms and/or preceded by a fever lasting at least two weeks and that is reported to be daily for at least three days: (a) evanescent erythematous skin rash that is not permanent; (b) enlargement of lymph nodes throughout the body; and (c) hepatomegaly and/or splenomegaly. (d) Serositis	(a) The patient's psoriasis or a first-degree relative's history of psoriasis; (b) arthritis in a male with HLA-B27 starting after age six; (c)sacroiliitis associated with inflammatory bowel disease, ankylosing spondylitis, enthesitis-related arthritis, Reiter's syndrome, acute anterior uveitis, or a first-degree relative's history of any of these conditions; (d) the presence of IgM rheumatoid factor at least twice, separated by at least three months; (e) Systemic arthritis
Oligo-arthritis	Persistent	arthritis that affects no more than four joints in the first six months of the illness.	(a) a patient's psoriasis or a first-degree relative's history of psoriasis; (b) arthritis in a male with HLA-B27 starting after age six; (c)sacroiliitis associated with inflammatory bowel disease, ankylosing spondylitis, enthesitis-related arthritis, Reiter's syndrome, acute anterior uveitis, or a first-degree relative's history of any of these conditions; (d) at least two instances, separated by at least three months, of IgM rheumatoid factor; (e) systemic arthritis
	Extended	More than four joints are affected by arthritis after the first six months of the condition.	
Polyarthritis with rheumatoid factor negativity		Five or more joints experiencing arthritis within the first six months of the condition, with a negative rheumatic factor test.	(a) The patient has psoriasis or a first-degree relative has had psoriasis in the past; (b) arthritis in a male with HLA-B27 starting after age six; (c)Ankylosing spondylitis, enthesitis-related arthritis, sacroiliitis with inflammatory bowel disease, Reiter's syndrome, or acute anterior uveitis, or a first-degree relative has had any of these conditions; (d)IgM rheumatoid factor is present at least twice, separated by at least three months; (e) Systemic arthritis
Polyarthritis with rheumatoid factor positivity		Five or more joints must be affected by arthritis during the first six months of the condition, and two or more rheumatic factor tests must be positive at least three months apart.	(a) The patient has psoriasis or a first-degree relative has had psoriasis in the past; (b) arthritis in a male with HLA-B27 starting after age six; (c)Ankylosing spondylitis, enthesitis-related arthritis, sacroiliitis with inflammatory bowel disease, Reiter's syndrome, or acute anterior uveitis, or a first-degree relative has had any of these conditions; (e) Systemic arthritis
Psoriatic arthritis		Psoriasis and arthritis or arthritis and two or more of the following conditions: (a) psoriasis in a first-degree relative; (b) nail pitting or onycholysis; and (c) dactylitis	(b) arthritis in a male with HLA-B27 starting after age six; (c)Ankylosing spondylitis, enthesitis-related arthritis, sacroiliitis with inflammatory bowel disease, Reiter's syndrome, or acute anterior uveitis, or a first-degree relative has had any of these conditions; (d) at least two instances, separated by at least three months, of IgM rheumatoid factor; (e) Systemic arthritis
Enthesitis-related arthritis		Five or more joints must be affected by arthritis during the first six months of the condition, and two or more rheumatic factor tests must be positive at least three months apart. Enthesis or arthritis combined with at least two of the following conditions: (a) the existence or history of inflammatory lumbosacral pain and/or sacroiliac joint tenderness, (b) the presence of HLA-B27 antigen, (c) the onset of arthritis in a male older than six years,	(a) The patient has psoriasis or a first-degree relative has had psoriasis in the past; (d) at least two instances, separated by at least three months, of IgM rheumatoid factor; (e) Systemic arthritis

	(d) acute symptomatic anterior uveitis (e) a history of ankylosing spondylitis, enthesitis-related arthritis, sacroiliitis associated with inflammatory bowel disease, Reiter's syndrome, or acute anterior uveitis in a first-degree relative;	
Undifferentiated arthritis	Arthritis that doesn't fit into any of the aforementioned categories or two or more of them.	

ETIOPATHOGENESIS

The cause of the disease is still not fully understood. The prevailing theory suggests that immunogenic mechanisms influenced by different genetic and environmental factors play a significant role. Infections, along with stress and trauma, are believed to be the primary causative factors. Recent studies indicate that gut microbiota is an important factor in autoimmune diseases, including JIA. The higher occurrence of autoimmune diseases in JIA patients points to a genetic predisposition for the disease. The most commonly cited genetic factors are human leukocyte antigen (HLA) B27 and other HLA tissue types. Various infections, such as enteric infections, parvovirus B19, rubella, mumps, hepatitis B, Epstein-Barr virus, mycoplasma, and chlamydia infections, are thought to be responsible for JIA pathogenesis. T-cells activated by potential triggers and cytokines released into the joints can cause damage. In response to these mediators, macrophages produce pro-inflammatory cytokines like interleukin (IL) 1, IL-6, and tumour necrosis factor (TNF)-α. As a result, markers of acute phase such as C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) rise, leading to acute joint inflammation and increased synovial fluid. Synovial inflammation (synovitis) is identified by the enlargement of villi and increased blood flow in the tissue below the synovium. Synovial hypertrophy and synovitis due to prolonged inflammation are referred to as "pannus". The percentage of T-cells in synovial fluids varies between different subtypes of juvenile idiopathic arthritis (JIA), which may account for the varying response to treatment among JIA subgroups.[4]

Systemic Juvenile Idiopathic Arthritis (JIA): -

Systemic JIA is generally classified as an autoinflammatory disorder. It involves recurring systemic inflammation due to abnormal innate immunity and excessive production of inflammatory cytokines like interleukin (IL)-1, IL-6, and IL-18, which is strongly linked to the clinical presentation.

Articular Juvenile Idiopathic Arthritis (JIA): -

A) Oligoarthritis and polyarthritis: - Oligoarthritis and polyarthritis are considered to develop due to abnormal adaptive immunity in a specific genetic background. Due to the different distribution of allelic polymorphisms in HLA-DRB1 and other immune-related genes, racial differences in the proportion of each JIA category are observed. In the affected joints, the articular cartilage and bone tissue are destroyed after the invasion of inflammatory cells and the formation of pannus caused by the proliferation of synovial cells. These inflammatory reactions are known to be associated with elevated levels of inflammatory cytokines such as tumor necrosis factor (TNF)-a and IL-6.

B) Juvenile Psoriatic arthritis (jPsA): - The presence of HLA-Cw6 and genetic polymorphisms of the autoimmune genes MEFV, NLRP3, NOD2 or PSTPIP1 are reported as candidates for an increased susceptibility to the development of psoriatic arthritis. In the affected joints, the hyperproduction of inflammatory cytokines, such as TNF-a, IL-1b and IL-6, is observed, and therefore it is assumed that these cytokines are involved in the inflammatory response.

C) Enthesitis -related arthritis (ERA): - A strong association of HLA-B27 with enthesitis-associated arthritis has been confirmed. Bacterial infections (Klebsiella, Salmonella and Yersinia), mainly in the intestinal tract, have been reported as environmental contributing factors. [6] Hyperproduction of inflammatory cytokines, including TNF-a, is seen in the afflicted joints, leading to further conjecture that these cytokines have a role in the inflammatory response.[7]

CLINICAL MANIFESTATION

Diseases of the Joints: -

Oligoarticular JIA usually affects the large joints of the lower extremities in an asymmetric pattern. Since oligoarthritis tends to affect children, the first symptoms that parents may notice are a limp or a swollen joint. Knees and ankles are the most affected joints. The joints may feel warm. They are usually not red or very painful. The surrounding muscles can atrophy as the child becomes more immobile. The onset of arthritis in RF-negative polyarthritis is highly variable. It can be acute or progressive. Large and small nodes are affected symmetrically or asymmetrically. The most commonly affected joints are the knees, ankles, elbows, wrists, cervical spine, temporomandibular joint (TMJ) and the small joints of the hands and feet. Children who are RF positive tend to have more aggressive arthritis. Both large and small joints can be affected and usually occurs symmetrically. The hips, cervical spine and TMJ can also be affected.

Juvenile Psoriatic Arthritis (JPsA) related arthritis usually begins as monoarthritis and can progress to polyarthritis. The knees, ankles and small joints of the hands and feet are most commonly affected. The distribution of polyarthritis is

often asymmetric. Arthritis of the hip is not uncommon. Also, sacroiliitis can be observed. Older children with PsA tend to have more enthesitis (diagnosed by specific tenderness and occasional swelling) and axial disease. Enthesitis refers to inflammation where ligaments and tendons connect to bones. In ERA, enthesitis usually occurs in the lower extremities. Children may report pain in the knee, leg or heel. On examination, children have tenderness or swelling where the enthesis fits into the bone. Peripheral arthritis can occur, often asymmetric and usually affects the lower extremities. Hip arthritis is common. Axial disease and sacroiliitis develop over time. On examination, pain may be caused by direct pressure on one or both sacroiliac joints.

Extra-Articular Manifestation: -

Uveitis is an extra-articular manifestation observed in all types of JIA, although at different rates. Uveitis in ERA is characterized by an extremely red, painful and photophobic eye. Regular eye exams are recommended for all children with JIA. Children with risk factors for uveitis, including female gender, oligoarthritis, younger age of JIA onset, and antinuclear antibody (ANA) positivity, should have more frequent eye exams. [8].

TREATMENT / MANAGEMENT:

NON-PHARMACOLOGICAL TREATMENT

The management of JIA involves a multidisciplinary approach, an important goal of the management of JIA is to promote the normal psychosocial and social development of the child and to deal with the possible difficulties caused by the disease or its consequences in family life. [9] Assistive devices (wheelchairs, walkers), aerobic conditioning and orthodontic appliances are all techniques used to help maintain physical function and prevent the development of disabilities. Psychiatric counselling with the help of a pediatric psychologist has also been shown to be beneficial, as many children with JIA experience anxiety and/or depression due to chronic pain and emotional distress due to the reduced ability to perform activities of normal childhood positive impact on well-being. of the child.

Physiotherapy and occupational therapy, with the aim of preserving or restoring as much as possible the function and alignment of the joints and to achieve normal mobility, are important elements of the therapeutic approach of every patient with JIA. Surgery may be indicated in patients who do not respond to pharmacological treatment.[10]

PHARMACOLOGIAL TREATMENT

Therapeutic intervention begins at diagnosis with nonsteroidal anti-inflammatory drugs (NSAIDs), followed by disease-modifying antirheumatic drugs (DMARDs, most commonly methotrexate) and/or intra-articular injection of corticosteroids.[2] Other considerations are sulfasalazine and leflunomide. Sulfasalazine is effective against peripheral joint arthritis in enthesitis-related arthritis. [8]

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs):

The first-line treatment is non-steroidal anti-inflammatory drugs (NSAIDs), which are often used in the treatment of JIA. NSAIDs have traditionally been the mainstay of treatment for all forms of JIA. At low doses, these medications relieve pain due to their analgesic properties, while at higher doses they show anti-inflammatory effects. In the first 1 to 3 days of treatment, a reduction in pain is usually observed. Only a few NSAIDs are approved for use in children: the most common are naproxen, ibuprofen, and indomethacin.[9] If the symptoms and inflammation are not controlled or worse, the treatment should be updated to include steroids or biologicals. [11]

NSAIDs are usually not enough to treat arthritis and do not target the underlying disease. A switch to a disease-modifying antirheumatic drug is usually necessary. If NSAIDs are not effective after an 8-week trial, it is indicated to switch to conventional or disease-modifying biological therapy. Methotrexate is a commonly chosen disease-modifying treatment that has been shown to be effective in clinical trials. [8]

Intra-Articular Injections:

In the management of pediatric JIA, IAC injections are commonly used, especially in cases of oligoarthritis, to quickly relieve inflammatory symptoms, improve functionality, and avoid the need for regular systemic treatment. [12] Some pediatric rheumatologists use a strategy that involves multiple injections of IAC in children with polyarticular JIA to achieve rapid resolution of synovitis, while simultaneously starting disease-modifying antirheumatic drugs (DMARD) and/or a biological agent. Triamcinolone hexacetonide (TH) is the drug of choice for JIA. [13] Although there is no established guideline for this practice, most rheumatologists limit the frequency of reinjections to three times a year. Side effects of CAI may include subcutaneous atrophic changes at the injection site, periarticular calcifications, crystal-induced synovitis, and potential risk of septic arthritis. French The uncertain association between IAC injections in the thigh and the development of avascular necrosis of the femoral head is remarkable. The use of systemic corticosteroids is mainly for the treatment of extra-articular manifestations of systemic arthritis, such as high fever that does not improve with NSAIDs, severe anemia and macrophage activation syndrome (MAS). [14] Methylprednisolone intravenous "pulse" of high doses (10-30 mg / kg / day up to 1 g / day for 1 to 3 consecutive days) shows effectiveness in the management of these manifestations, although with a short-term effect duration Thus, continuous corticosteroid therapy with oral prednisone (1-2 mg/kg/day up to 60 mg/day in single or divided daily doses) is often essential. In cases of severe polyarthritis resistant to other treatments or while waiting for the full therapeutic effect of a recently started second-line agent or biologic, a short course of low-dose prednisone (eg, 0.5 mg/kg / day). [15]

Basic Organic Care:

Tumor necrosis factor-α inhibitors (TNFi) remain the most widely prescribed biologic agents for the treatment of JIA. Elevated levels of the pro-inflammatory cytokine TNF-α are observed in children with JIA and, therefore, inhibitors of these cytokines play an important role in modifying the progression of the inflammatory disease. Agents available in this class include etanercept, adalimumab, and infliximab. Although all three agents target TNF-α, they differ slightly in how they achieve its inhibition. Adalimumab and infliximab are monoclonal antibodies, while etanercept is a soluble receptor antagonist. [10]

Etanercept

Etanercept is approved for the treatment of polyarticular JIA in patients older than 2 years, including those with prolonged oligoarthritis, as well as psoriatic arthritis and enthesitis-related arthritis in patients older than 12 years. The mechanism of action of etanercept is as follows: a fusion protein consisting of the extracellular domain of the human TNFα receptor p75 linked to the Fc region of human IgG1 binds to and inhibits soluble TNFα. [2,16]

Adalimumab

Adalimumab is a humanized monoclonal antibody that prevents the interaction of TNF-α with TNFR p55 and p75 on the cell surface. Adalimumab is usually administered at a dose of 24 mg/m2 every 15 days (maximum 40 mg). Subcutaneous (SC) adalimumab is used to treat juvenile rheumatoid arthritis, uveitis, and other chronic debilitating diseases caused by TNF. The use of adalimumab is safe and effective in patients with JIA. When adalimumab is used with a non-biological DMARD (eg, methotrexate), it becomes more potent. [17] The German Register of Biology shows that adalimumab is extremely effective in the treatment of children and adolescents with inflammation. [17,18] Interim results from the STRIVE registry showed that adalimumab was well tolerated and effective in treating the majority of children with pJIA over the past seven years. Other major biological databases have shown that adalimumab and infliximab have equal efficacy in patients with JIA (excluding systemic disease subtypes) after failure of etanercept. [19]

Infliximab

Infliximab (INF) is a highly human chimeric anti-TNF antibody that shows good efficacy in patients with chronic intestinal disease unresponsive to conventional treatment. For rheumatoid arthritis in adults, INF is approved only in combination with MTX.[10] The ease with which the dosage can be increased without requiring patients to endure more, occasionally uncomfortable injections are one special benefit of infliximab therapy. It has recently been shown that children with JIA can safely receive doses as high as 20 mg/kg/dose every two weeks, though the efficacy of this strategy is still unknown. [20]

Anakinra

Anakinra is a recombinant human IL-1 receptor antagonist. It competes with the natural ligand IL-1 beta type I receptor (IL-1RI) on the cell surface, thus blocking the inflammatory responses triggered by high levels of IL-1. A dose of 2 to 10 mg/kg/day can be administered only subcutaneously (maximum 200 mg/day). Several large-scale controlled studies have confirmed the efficacy of anakinra in children with sJIA without compromising its safety record. The Dutch population registry "National ABC" determined that anakinra had better results than TNF-α blockers in children diagnosed at a young age (and less than one year) or during periods of early puberty (beginning of puberty between 9 and 14 years) [19].

Abatacept

Abatacept is a soluble fusion protein composed of T4 cytotoxic antigen fused to the Fc region of human IgG that binds to CD80/CD86 and blocks the post-engagement signal of the MHC: TCR peptide required for l activation of T lymphocytes [20, 2]. Abatacept can be administered intravenously or subcutaneously, and a prospective clinical trial with subcutaneous application of abatacept showed that the subcutaneous route was effective.

Tocilizumab

Tocilizumab (TOC) is a monoclonal antibody that prevents the binding of interleukin-6 to its receptor. Therefore, the pro-inflammatory effects of interleukin-6 are suppressed. First clinical trial in patients with polyarticular JIA. Nineteen patients received 8 mg/kg body weight TOC every 4 weeks for a period of at least 48 weeks. 75 adverse reactions occurred in 48 weeks, with the most frequently reported cases being nasopharyngitis and upper respiratory tract infection, which affected 9 cases each. Serious adverse reactions were observed in four patients, including 2 cases of gastroenteritis, one case of mycoplasma pneumonia and one patient with sensory disturbances. There are no negative effects that cause OCD to stop. [21]

Rituximab

Rituximab is a monoclonal antibody directed against the CD20 antigen on the surface of B lymphocytes, thus preventing the inflammatory cascade. The French ACR guidelines suggest that rituximab can be used in patients with less than five affected nodes who receive an IL-1 inhibitor and tocilizumab sequentially or a DMARD plus an IL-1 inhibitor or tocilizumab. In addition, it can also be used in patients with five or more affected nodes who have failed an IL-1 inhibitor and tocilizumab or a DMARD plus an IL-1 inhibitor, tocilizumab, TNFi or abatacept. In addition, the use of rituximab has also been reported in limited cases for refractory JIA.[22]

Golimumab

Approved for the treatment of JIA since 2016, golimumab (GOL) is a human monoclonal antibody that binds to the soluble and transmembrane forms of TNF and completes

the group of TNF inhibitors approved for the treatment of JIA. Brunner etc. conducted a randomized, double-blind, placebo-controlled, three-part withdrawal trial.[23]

NON-BIOLOGICAL DMARDS:

The American College of Rheumatology (ACR) recommends the early use of DMARDs, particularly MTX, leflunomide and/or sulfasalazine.

Methotrexate

Methotrexate (MTX) remains the most widely used conventional disease-modifying treatment in the management of JIA due to its efficacy in disease control and its acceptable toxic effects [24]. MTX exerts its maximum therapeutic effect with the parenteral administration of 15 mg/m2 per week and there is no additional benefit from the administration of higher doses up to 30 mg/m2 per week. MTX can be administered orally or subcutaneously, with research showing greater efficacy when administered subcutaneously [25].

Leflunomide

Leflunomide suppresses the production of pyrimidines, thus inhibiting the proliferation of lymphocytes. Ayaz et al. showed that leflunomide can provide a durable treatment option for patients who cannot tolerate MTX and, in cases of low disease activity, can reduce the need for biologicals. Leflunomide can serve as an alternative background treatment for psoriatic JIA in cases of MTX intolerance [26].

Sulfasalazine

Sulfasalazine interferes with the activity of enzymes and transcription factors associated with the production of proinflammatory cytokines. Possible side effects include nausea, vomiting, diarrhea, loss of appetite, rash, bone marrow suppression, and hepatitis. Inhibition of dihydrofolate reductase by sulfasalazine can lead to folate deficiency and megaloblastic anemia. Patients with sulfa sensitivity should refrain from using sulfasalazine because of the potential risk of developing Stevens-Johnson syndrome. Regular monitoring of CBC and liver enzyme levels is recommended [10].

EMERGING THERAPY:

New medications for juvenile idiopathic arthritis (JIA) are currently being developed and undergoing clinical trials to improve treatment options. Clinical trials are currently examining the safety and potential efficacy of tadekinig alfa (anti-IL18) and emapalumab (anti-IFNγ) for the treatment of sJIA [27,28]. Other biologics that show potential include sarilumab, secukinumab and ustekinumab. Secukinumab inhibits IL-17A while ustekinumab inhibits IL-12/IL-23, targeting specific pathways of the immune system. A 2021 study in Rheumatology compared patients and characteristics that were treated with ustekinumab or secukinumab in the setting of psoriatic arthritis. A French study showed that secukinumab had a higher rate of drug persistence after 2 years than ustekinumab, suggesting that patients might be more inclined to continue with secukinumab [29]. Another group of biologic DMARDs are the Janus-linked tyrosine kinase (JAK) inhibitors. Its action consists in blocking JAK-STAT pathways to stop the transmission of external pro-inflammatory signals to the cell nucleus. Exploration of the efficacy of tofacitinib and baricitinib, the first generation of JAK inhibitors, began with adults with RA and later extended to other autoimmune diseases, such as ankylosing spondylitis, SLE, inflammatory bowel disease and psoriasis. The safety and efficacy of tofacitinib in the treatment of pJIA was confirmed in a double-blind multinational clinical trial (NCT02592434), showing a reduction in relapses and disease activity [30].

FUTURE PROSPECTIVE

Juvenile idiopathic arthritis (JIA) management and understanding its aetiopathogenesis are rapidly evolving. Recent studies have shed light on the molecular mechanism and genetic predispositions that contribute to JIA, paving the way for more targeted and effective treatment. Investigate the role of environmental factors and disease onset and progression. Despite advances in modern therapies that improve patient outcomes, a significant proportion of patients do not respond to treatment. This highlights the need for a deeper understanding of disease progression and recovery to properly categorize patients based on appropriate treatment options.

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