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Review Article

Juvenile Idiopathic Arthritis

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An Ayurvedic Review on Juvenile Idiopathic Arthritis along with its Management

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Juvenile idiopathic arthritis (JIA) is the most common rheumatic disease in children and one of the more common chronic illnesses of childhood. It refers to a group of conditions characterized by chronic inflammatory changes of the joints. During the course of a disease the number of involvement of joints, type of joints involved will decide the type of JIA according to ILAR classification. The symptoms present in JIA are more comparable with features of Amavata Vyadhi mentioned in Ayurvedic classics. Amavata is a chronic disease of joints pain and body ache accompanied by a swelling of some or all of the synovial joints which involves Ama and Vata. It is a disease of Madhyam Marga Roga as it affects Sandhi and Hridaya Marma. The main line of treatment for Juvenile idiopathic arthritis (JIA) to bring Agni (digestive power) in normal state to digest Ama. Shodhana and Shamana therapy of Ayurveda are useful to treat this disease. Shodhana therapy with Snehan with medicated oil, Nadi Swedan, Valuka Pottali Swedan and Mridu Virechan shows great improvement in the symptoms. It will also decrease the progression of disease. Rasayana is indicated in Samhitas that helps in preventing deformities and support physical and mental strength of a child.

Keywords: Juvenile idiopathic arthritis, Amavata, Vaitaran Basti, Virechana

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Introduction

The term Juvenile Idiopathic Arthritis (JIA) was proposed by the paediatric Standing Committee of the International League of Associations for Rheumatology (ILAR). JIA represents a heterogeneous group of disorders sharing the clinical manifestation of arthritis. It is defined as arthritis of one or more joints with onset below the age of 16 years and persisting for at least 6 weeks. JIA is not a rare disease; its estimated prevalence ranging from 0.4 to 1.3 per 1000 children below 16 years of age. It is the commonest Rheumatological disorder of childhood and one of the most common causes of disability, chronic morbidity and school absenteeism. While the Western studies suggests that JIA is more common in girls, in India the female predominance is not marked.**[1]**

Etiology and Pathogenesis of JIA is not completely understood. Genetic susceptibility is a major factor. However, there is significant association of JIA with other autoimmune diseases. Association with HLA B27 has also been noted.**[2]** JIA represents a heterogeneous group of disorders sharing the clinical manifestations of arthritis. The etiology and pathogenesis of JIA are largely unknown and the genetic component is complex, making difficult to clear distinction among various subtypes. As a result, several classification schemes exist, each with its own limitations.**[3]**

The symptoms present in JIA are more comparable with the features of *Amavata Vyadhi* mentioned in *Ayurvedic* classics. *Amavata Vyadhi* is not mentioned for Paediatric age group but due to its parallel clinical appearance same reference necessitates for *Ayurvedic* treatment.**[4]** *Vata* related diseases are very common and global. *Amavata* is a chronic joint disorder accompanied by a swelling of the synovial joints which involve *Ama* and *Vata*. In this review article, we will summarize brief description of Juvenile idiopathic arthritis (JIA) in children along with treatment options in *Ayurveda*, which emphasizing safety as well as the usefulness.

Materials and Methods

The information stated in this article has been retrieved from numerous texts along with literatures of both classical as well as contemporary, published papers and internet-based database searches.

- Epidemiology - The worldwide incidence of JIA ranges from 0.8 - 22.6 per 100,000 children per year, with prevalence ranges from 7 - 401 per 100,000. The peak age at onset is 2-4 year for oligoarticular disease. Age of onset has a bimodal distribution in polyarthritis; with peaks at 2-4 year and 10-14 yr. JIA occurs throughout childhood, with a peak at 1-5 year.**[5]**
- Etiopathogenesis - JIA is Complex and Poorly under-stood, though definitely involves

A. An autoimmune reaction to hitherto unknown external triggering factors, e.g. viral infections or joint trauma
B. An inherent immunological susceptibility to these reactions with predisposition to specific HLA types.

HLA-DR4 in polyarticular disease and HLA-DR8/5 in oligoarticular disease.**[6]**

- Pathogenesis - Pathologically, tissue injury is characterized by

A. Hyperaemia and oedema of sub-synovial tissues,
B. Pannus formation over articular cartilages
C. Chronic inflammatory infiltration

Table 1: Criteria for the classification of juvenile rheumatoid arthritis[7]

1) Age at onset	<16 years
2) Arthritis	>1 or equal to 1 joint
3) Duration of disease	6 weeks or >6 weeks
4) Onset type	Defined by type of articular involvement in the 1st 6 months after onset:

ILAR classification of JIA[7]

1) Oligoarthritis: Oligoarthritis is the most frequent type of JIA accounting for approximately 60-70% of patients. Four or fewer joints (usually large) are affected during the first 6 months of the disease. The involvement is often asymmetrical. Joint swelling, rather than joint pain, is the usual complaint. Two subtypes are described: persistent (if number of affected joints continues to be 4 or less) and extended (if number of affected joints exceeds 4 during the disease course. Oligoarthritis is more common in young girls, typically 3-5 yrs of age.

2) Polyarticular: Polyarthritis occurs in 25-30% of patients and is more common in girls. Joint pain, out of proportion to the degree of joint swelling, is the usual complaint. Fever and malaise can be significant. Two subtypes are known.

A. Rheumatoid factor negative: This subtype may occur at any age in childhood. The knees, wrists and hips are the joints usually affected. Small joints of hands and feet are less commonly involved and rheumatoid nodules are not seen. Joint disease in this subtype of JIA is far less severe than that seen in patients who are rheumatoid factor positive.

B. Rheumatoid factor positive: The age at onset is late childhood or early adolescence. The arthritis is symmetrical, additive, severe and deforming and typically involves the small joints of the hands, especially the metacarpophalangeal and the proximal interphalangeal. Cervical spine and temporomandibular joints can also be affected. This subtype is the only category of JIA which is somewhat similar phenotypically to adult-onset rheumatoid arthritis. Rheumatoid nodules are present in some patients and they usually manifest severe disease.

3) Systemic arthritis: The illness usually begins as an intermittent fever with a characteristic twice daily peak (quotidian fever). Fever is prominent in the evening hours. It is accompanied by a characteristic evanescent maculopapular rash (with central clearing), which is prominent on the trunk. This rash may be difficult to recognize in individuals with dark skins. Affected children show marked irritability, which decreases with subsidence of fever. Serosal involvement (in the form of pericarditis or pleuritis) may be prominent. Hepatospleenomegaly and lymphadenopathy are common at presentation and can lead to diagnostic confusion. There is a moderate neutrophilic leukocytosis and an elevated erythrocyte sedimentation rate along with thrombocytosis. The rheumatoid factor is negative.

4) Enthesitis - related arthritis - This condition is more common in boys, typically older than 8 yrs. large joints of lower extremities are commonly affected. Many children are HLA B27 positive and a proportion of these may go on to develop ankylosing spondylitis later as adults. However, sacroiliitis and spondylitis are usually not significant till late adolescence.

5) Psoriatic arthritis: Psoriatic arthritis is said to be present when there is arthritis in association with psoriasis or any 2 of the following features: dactylitis, nail pitting and psoriasis in a first degree relative. Arthritis may precede, accompany or follow the occurrence of psoriasis in children. Simultaneous occurrence of small and large joint arthritis or involvement of the distal interphalangeal joint is important clinical clues to the condition.

6) Undifferentiated arthritis: The term undifferentiated arthritis is used when they give symptoms of two or more subtypes.**[8]**

Clinical Examination

Table 2: Main clinical features of JIA are[9]

1)	Pain with swelling on single or multiple joints.
2)	Daily fever
3)	Evanescent rash
4)	Problem with bone development and growth
5)	Anaemia
6)	Uveitis
7)	Hepatosplenomegaly
8)	Lymphadenopathy
9)	Pericarditis, Peritonitis

Diagnostic test:

Table 3: Important investigations for JIA are[10]

1)	Erythrocyte sedimentation rate (ESR)
2)	C- reactive protein (CRP)
3)	CBC (Complete blood count)
4)	RA factor (Rheumatoid factor)
5)	ANA titre (Anti-nuclear antibody)
6)	HLA (Human leukocyte antigen) B27

Management: Multi-Disciplinary management [11]

1. NSAIDs are the mainstay of symptomatic management. The NSAIDs commonly used in children are naproxen and ibuprofen. Indomethacin is believed to be of particular use in enthesitis related arthritis.

- Naproxen: Owing to its strong anti-inflammatory activity and overall favourable toxicity profile, it is commonly used NSAID in juvenile idiopathic arthritis in a dose of 10 to 20 mg/kg/day every 8 - 12 hours orally. Contra-indication: Peptic ulcer diseases, salicylate or NSAID allergy and advanced renal diseases.
- Ibuprofen: It is antipyretic and analgesic. 5-10 mg/kg/dose every 6-8 hours orally. It is one of the safest traditional NSAID with favourable efficacy profile. Contraindication: Salicylate or NSAIDS allergy, peptic ulcer disease.

2. Role of steroids: 1) Prednisolone is frequently used. Dose is 2 mg/kg/day for every 12 hours for 2 - 6 weeks. Taper it over next 4-12 weeks. 2) Methylprednisolone. Corticosteroid joint injection can be given.

3. Disease Modifying Anti-Rheumatic Drugs (DMARD): It works to modify course of disease, suppressing immune system to prevent it from attacking joints. 1. Methotrexate 2. Sulfasalazine 3. Leflunomide

4. Biological agents: They work directly on target specific molecule or proteins that are involved in the disease. Continuous use of NSAID's causes gastric irritation, acid peptic disease, allergy or renal diseases.

5. Nutritional therapy: Calcium and Vitamin-D is advised in patient on corticosteroid. Ensure proper protein and calorie intake.

6. Physiotherapy and occupational therapy: It should be tailored to the specific needs of an individual child, in order to prevent deformities and facilitate 'mainstreaming' and rehabilitation.

Physical therapy helps in relieving pain, maintenance of posture and joint mobility, improves muscle strength and prevents fixed flexion deformities. It is important exercise for joints to prevent deformities.

7. Orthopaedic and Rheumatologist: Splint and foot orthotics may be recommended.

8. Psychologist: To support the mental ability and to give moral support to the patient.

9. Ophthalmologist: To prevent uveitis i.e., inflammation of the middle layer of the eye (uvea).

Introduction about *Amavata Vyadhi*

Vyadhi: *Amavata* is a degenerative illness in which Ama is aggravated by *Vata Dosha* and settles in *Sandh*i, producing severe pain, inflammation, hotness in the joints and finally joint weakness, causing transitory or permanent impairment of the joints and impeding daily activities.

Nidana* (Causes*): *Nidana* is defined as the factors which disturbs the active state of *Dosha* equilibrium aggravates the disease is known as *Nidana*. A separate *Nidana* according to *Madhavakara* is mentioned here under**[12]**

Table 4: *Nidana* of *Amavata*

1. Viruddha Ahara (Incompatible food)
2. Viruddha Chestha (Incompatible actions)
3. Mandagni (Hypo functioning of Agni)
4. Nischala (Lack of exercise)
5. Snigdha Ahara followed by immediate exercise.

Samprapti: *Amavata* is a chronic joint disorder accompanied by a swelling of the synovial joints which involve *Ama* and *Vata*.**[13]** *Ama* is the product of faulty digestive process which is the fundamental cause of the illness. This acts as a *Visha* in the body, causing a variety of diseases, the most dangerous of which is *Amavata.* The affliction of *Sandhis* by *Vata Dosha* in association with *Ama*, reflects the equal role of both *Dosha* and *Dushya* in the causation of this disease. It can be produced as a consequence of *Jatharagnimandya*, *Prathama Doshdushtijanya* and *Malasanchayajanya*. Unhealthy eating and behaviour habits in pre-existing *Agnimandya* leads to further vitiation of *Ama* which can be consider as *Rasadhatvagnimandyajanya Ama* or *Saam Rasa Dhatu* which is said to gain *Vidagdhata*. When it is carried out with *Samavayu* and takes shelter in *Kaphasthana Sandhi*, it produces *Amavata with Sandhishool, Sandhishotha, Sandhigraha, Angamarda, Aruchi, Trishna, Jwara, Gaurava.* It may further produce complications as *Nidraviparyaya, Bahumutrata, Hridgraha* according to *Dosha Dushti.***[14]**

Lakshana

Table 5: Cardinal features of *Amavata*

1) Sandhishoola
2) Angamarda
3) Aruchi
4) Trishna
5) Alasya
6) Jwara
7) Gauravata
8) Angashoonat

If not treated properly, the *Madhyama Marga Roga*. **[15]**

Fundamentals in the management of JIA: The main line of treatment for Juvenile idiopathic arthritis (JIA) to bring *Agni* (digestive power) in normal state to digest *Ama* and do away with vitiated *Vata* and *Ama*. Because *Ama* is precursor to inflammation which further changes in Juvenile idiopathic arthritis (JIA).**[16]**

Ayurveda treats diseases by using two different methods.

A. Shodhana therapy (Purificatory): *Shodhana* therapy means detoxification of the body by expelling the deranged *Doshas* (morbid materials inside the body causing various diseases) and this is done by *Panchkarma*

B. Shamana therapy (Pacificatory): *Shamana* therapy is appeasement of symptoms without eliminating the morbid *Doshas* and this is done by herbal or herbo-mineral drugs.

Management of JIA by Ayurveda

1) Langhana: The word *Langhana*" represents therapeutic fasting, hunger or intentional starving**[17]** in broader perspective, it includes the therapies intended for reducing or depleting or lightening the body components. This is one among the six basic treatment protocols in *Ayurveda*. This therapy is applied to reduce any abnormally increased body component and bring it back to normal level to maintain equilibrium. It is indicated in the abnormal accumulation of *Dosha (Pitta/Kapha/Rakta),* any waste product, state of *Dosha* associated with *Ama*, and indigestion.**[18]**

2) Swedana: for *Swedana* therapy mostly dry fomentation is useful.

- ***Valuka Pottali Sweda*****[19] -** This is typical *Ruksha Swedana* in which bolus of sand is used. *In Valuka Swedana* sand can be heated in *Dhanyamula* along with *Saindhava Lavana. Valuka Swedana* is very effective in relieving the signs and symptoms of *Amavata*. *Sukshma* and *Tikshna* properties of *Saindhava Lavana* helps to pass the drug molecule in systemic circulation through the mucosa. *Valuka Swedana* helps the *Basti Dravya* to reach up to the molecular level. Uttermost care should be focus mainly on heat of bolus; mainly moderate heat should be taken.
- ***Nadi Swedana*** **(Steam):** Sweating is induced by means of steam coming from the fluid which may contain many *Vata Shamak* The *Swedana* (sudation) *Karma* is considered as the main treatment of *Vata Roga*; due to its *Ushna Guna* overcomes *the Sheeta Guna* of *Vata. Swedana* (sudation) *Karma* relieved in *Sheeta* (cold), *Shoola* (pain) and *Sthamba* (stiffness) in JIA. **[20]** *Nadi Swedana* with *Abhyanga* facilitates in removal of *Aavarana* and *Srotorodha*.
- *Nadi Swedana* is very helpful in JIA by relieves spasticity, improves joint mobility or range of motion (ROM).**[21]**
- ***Upanaha Swedana:*** It is one among the types of *Swedana Karma* as explained by many *Acharyas*. It is a local treatment where in combination of *Churnas* are made into paste using *Sneha Dravya (Ghrita, Taila), Kinva* (fermented liquid), made warm and applied over affected site.**[22]** This is to reduce the local inflammation at the site and also acts as topical analgesic by the action of drugs absorbed through dermis.

3) Deepana: To monitor development of illness, *Agni Deepana* should be finished after *Amapachana*. As result, *Agni Deepana* was finished utilizing *Tikta, Katu Rasatmaka* & *Ushna Virya Dravya*, which is comparable to *Shunthi Churna*.

4) Virechana Karma: *Agnideepti* classical *Virechana Karma* needs to be practiced for long term results. It is essentially cleansing in nature, removing vitiated *Dosha* in general and *Pitta* in particular, clearing *Srotas* (Channels of transportation) and enhancing *Agni*, all of which work together to help prevent the formation of *Ama*. A lot of fluid will also be excreted along with *Dosha*, which may help to reduce swelling by removing inflammatory mediators.

5) Basti Karma: Most effective form of treatment for vitiated *Vata Dosha* is **[23]** *Vata Dosha* has major part in most of disorders.**[24]** *Vata Dosha* results in *Praspandana* (moving), *Udvahana* (carrying), & *Vivek* (to separate) *Vata Dosha* has bility to mobilize pathological accumulation of *Dosha* from periphery into *Koshtha*, as stated in *Samhitas.* **[25]** Pain, stiffness and swelling are thereby reduced by controlling *Vata Dosha's* movement.

6) Vaitarana Basti **(Type of medicated enema):** *Vaitarana Basti* is a specific type of *Basti* that is mainly indicated in the treatment of *Vaitarana Basti* has very dominant cleansing action.**[26]** *Vaitarana Basti* used as a cleansing therapy which can clear the closed channels and renovate its normal function. It is a type of *Niruha Basti* and it got its name due to the specific ability to cure disease.**[27]**

7) Internal medications*:* *Simhanada Guggulu, Chitrakadi Vati, Rasnasaptaka Kwatha* and some single herbal drugs etc. are main drug which are used in *Shaman* therapy of JIA.

A) Simhanada Guggulu: *Tikta* and *Katu Rasa* present in *Simhanada Guggulu* possess the antagonistic properties to that of *Ama* and *Kapha* which are the chief causative factors in this disease. Because of their *Agnivriddhikara* property, they increase digestive power, which also digests *Amarasa* and reduces the excessive production of *Kapha* and also removes the obstruction of the Because of *Ushna Virya,* it also alleviates vitiated *Vata.***[28]**

B) Chitrakadi Vati: *Chitrakadi Vati* is given in 2nd line of treatment to improve digestive power because decreased *Agni* or metabolic fire is most important in the pathogenesis of JIA/*Amavata*. Due to lack of *Agni,* alteration of bacterial flora of the gut occurs that result in dysfunction of the macro and micro channels of transport or *Chitrakadi Vati* increases the digestive and metabolic fires (*Agni*) in JIA patients by its *Deepana, Pachana* (enhance proper digestion) property.

Chitrakadi Vati also helps to avoid indigestion during course of *Panchakarma* procedure. Main Ingredients of *Chitrakadi Vati* is *Chitraka* (Plumbago zeylanica), *Pippali Mool* (Piper longum), *Sarjikakshar* (Sodium carbonate), *Yavakshar* (Potassium carbonate) and *Pancha Lavana* (Five salts), etc. *Agnitundi Vati* can also be given for increases the digestive and metabolic fires (*Agni*) in JIA patients.

C) Rasnasaptak Kwatha: *Rasnasaptak Kwatha* is Ayurvedic polyherbal decoction prescribed as *Vata Shamak* property and can be used for pain relief in Juvenile idiopathic arthritis (JIA). Main Ingredients of *Rasnasaptak Kwatha* is *Rasna* (*Pluchea lanceolata*), *Erandamoola* (*Ricinus cumminis*), *Gokshura* (*Tribulus terrestris*), *Punarnava* (*Boerhaavia diffusa*), *Amrita* (*Tinospora cordifolia*), *Aragwadha* (*Cassia fistula*), etc.

Rasnasaptak Kwatha responds on all cardinal symptoms of arthritis such as inflammation, pain, stiffness, etc. it works as an immunosuppressive and antioxidants action for the management of JIA symptoms by countering at cellular and bio molecular level.**[29]**

D) Single herbal drugs: According to the world health organization (WHO) 80% of world's population depends on herbal drugs for their primary health care.**[30]** Following herbal drugs have potent anti-arthritic activity without any side effects.

Table 6: Single herbal drugs used in JIA

Dravya	Latin name	Parts used
1) Shallaki	Boswellia serrata	Resin
2) Rasna	Pluchea lanceolata	Root
3) Gokshur	Tribulus terrestris	Fruit
4) Guduchi	Tinospora cordifolia	Stems
5) Erandamool	Ricinus cummunis	Root
6) Punarnava	Boerhavia diffusa	Whole plant
7) Aragwadha	Cassia fistula	Root

Pathya Ahara: The diet used in Juvenile idiopathic arthritis (JIA) should be *Laghu* (easily digestible) and *Agnivardhaka*. High *Agni* is manifested by more appetite and *low Agni* by loss of appetite and heaviness feeling in the abdomen. *Agni* is high around noon time due to *Pitta* dominance so morning diet and evening diet should be light and lunch should be heavy in Juvenile idiopathic arthritis (JIA).

Discussion

JIA is a used term for chronic arthropathy in children. Unexplained fever, unexplained muscular tenderness, serositis, arthralgia and unexplained multisystem involvement are the symptoms generally seen in children. The exact aetiology of the disease is not identified clearly. It has genetic susceptibility, may have alteration in host antigen due to some extraneous factor. Self-tolerance is lost in Rheumatic or Autoimmune disorders.

While treating this disease, multidisciplinary approach will be beneficial to the patient. As age group is small, they have to suffer this disease lifelong. The modern treatment has to give NSAIDs, Steroids and physiotherapy. Methotrexate - type of drug, known for Disease Modifying Anti Rheumatic Drug (DMARD) has major side effects such as hepatic, pulmonary, renal and bone marrow abnormalities. Long term use of steroids has impact on immunity. Child becomes susceptible for infections. The good management of the disease should be able to reduce the symptoms as well as should not hamper the growth and development of child.

Ayurveda provides various *Panchkarma* procedures in treating this disease. *Swedan* therapy will definitely reduce the joint pain. *Mrudu Virechan* will help to remove toxins from the body. Use of *Simhanada Guggulu, Chitrakadi Vati* and *Rasna Saptak Kwath* will break pathology of disease.

Surprisingly the drugs chosen by *Acharyas* when studied from modern point of view are immunomodulators in nature. Many research articles show that these drugs have anti-inflammatory as well as immunomodulatory effect. *Ayurvedic Rasayan* like *Chayawanprash* and *Suvarnaprashan* will definitely help in this condition also various *Suvarna Kalpas* are very useful to overcome the heart diseases which developed later in JIA patient because *Suvarna* is said to be *Hridya* according to *Samhitas*.

Conclusion

JIA is chronic inflammatory process in which children have lifelong impact. Self-dependency is affected. Their physical as well as mental development may get affected. For this purpose, Ayurveda has more scope. Many herbal drugs are anti-arthritic and immunomodulators in nature. They can be easily available, much cost effective, less side effects. The symptoms present in JIA are more comparable with features of *Amavata Vyadhi* mentioned in *Ayurvedic* classics. In Juvenile idiopathic arthritis (JIA) mainly vitiated Vata associated with *Ama* (undigested toxic substance) and produce particular symptoms affecting the bony joints and systemic system. In contemporary treatment of JIA many drugs are used, which associate with major side effects such as hepatic, pulmonary, renal and bone marrow abnormalities; and minor effects such as malaise, nausea and diarrhea. The selected Ayurvedic treatment is very effective in relieving the symptoms of JIA patients and no side effect on any systems. In Ayurveda, *Shodhana* therapy, such as *Virechana Karma*, *Langhana*, *Vaitarana Basti* (type of medicated enema) is very effective in management of JIA. In *Shaman* therapy mainly *Simhanada Guggulu, Chitrakadi Vati and Rasnasaptak Kwatha* is effective in relieving pain and swelling of joints. Some herbal drugs also have very potent consideration as anti-arthritic activity such as *Shallaki* (*Boswellia serrate*). This option is effective in improves quality of life (QOL), swelling, pain, and restriction of movement (ROM) in JIA patients. It has positive and hopeful effect; it is revolution in treatment by Ayurveda.

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