Original Article

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Etiological Profile of Arthritis in Children between 6 Months and 12 Years of Age Admitted in a Tertiary Care Hospital

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Abstract

Background: Arthritis in children has various causes which may be different from region to region. The clinical manifestation of a disease with arthritis is protean. The aim of this study to analyze the etiological profile of children between 6 months and 12 years of age admitted with arthritis in a government tertiary care hospital in Tamil Nadu.

Materials and Methods: It is a descriptive study conducted in a tertiary care hospital in Tamil Nadu, over a period of 18-month. All children between 6 months and 12 years of age who got admitted in the pediatric ward with arthritis were included in the study.

Results: Out of 56 cases, 23 (41.0%) cases of arthritis were due to rheumatic fever, which was the most common cause in this study. Next to this was juvenile rheumatoid arthritis which comprises 37.5% (21 cases) of total. Septic arthritis comprises 12.5% of total arthritis.

Conclusion: Arthritis is one of the common causes of morbidity in children. Etiological analysis is essential to guide the prognosis and treatment.

Key words: Arthritis, Children, Etiology, Rheumatic fever

INTRODUCTION

The word arthritis is derived from the Greek word "arthron" meaning joint, and the suffix – its meaning inflammation.[1] Today, objective inflammation of a joint is referred to as arthritis. The term arthralgia indicates joint pain without objective evidence of inflammation.

Definition

Arthritis is defined as articular swelling/effusion or presence of two or more of the following signs:

1. Limitation of range of movement
2. Joint tenderness on palpation
3. Pain on joint movement
4. Increased heat over joint.

Arthritis involving one joint is called as monoarthritis, those involving 2 to 4 joints are called as pauciarthritis, and involvement of 5 and more joints are called as polyarthritis.

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Classification of Arthritis[2]

Arthritis is broadly classified into two types.

Arthritis associated with inflammatory diseases of childhood

1. Juvenile chronic arthritis
2. Arthritis associated with infectious agents
3. Arthritis associated with connective tissue disorders other than juvenile chronic arthritis
4. Arthritis associated with immunodeficiencies.

Arthritis associated with non-inflammatory disorders

1. Traumatic arthritis

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2. Arthritis associated with metabolic disorders
3. Arthritis associated with hematological disorders
   A. Juvenile chronic arthritis is further subclassified into:
      i. Juvenile rheumatoid arthritis (JRA)
         It is further subclassified into:
         - Oligoarticular onset
         - Polyarticular onset
         - Systemic onset.
      ii. Spondyloarthritis – subclassified into:
         - Juvenile – onset ankylosing spondylitis
         - Juvenile onset psoriatic arthritis
         - Arthritis with inflammatory bowel disease
         - Reiter's syndrome.
   B. Arthritis associated with infectious agents – subclassified into:
      i. Infectious arthritis
         - Bacterial
         - Viral
         - Spirochetal
         - Others.
      ii. Reactive arthritis
         - Acute rheumatic fever
         - Post-*Streptococcal* arthritis
         - Reactive arthritis after *Shigella, Salmonella,* and *Yersinia* infection
         - Reactive arthritis after parasitic infections such as, *Giardia*, Intestinalis, *Toxocara canis,* and Schistosomiasis.
   C. Arthritis associated with connective disease disorders other than juvenile chronic arthritis
      i. Systemic lupus erythematosus (SLE)
      ii. Juvenile dermatomyositis
      iii. Systemic sclerosis
      iv. Vasculitis – subclassified into:
         - Polyarteritis nodosa
         - Kawasaki disease
         - Henoch – schonlein purpura
         - Wegener's granulomatosis.

Even though more than 100 diseases were associated with arthritis, the diagnosis most frequently established was septic arthritis, rheumatic fever arthritis, and JRA. Less frequent was SLE, dermatomyositis, various vasculitis syndromes, tuberculosis arthritis, hemophilic arthritis, and rarely psoriatic arthritis.

JRA

It is a disease or a group of diseases of unknown etiology affecting children of <16 years of age characterized by chronic synovitis leading to deformities and with a number of extra-articular manifestations. It is the most common connective tissue disease in children. Disease subtypes[3] defined during the first 6 months of disease are (a) Polyarticular onset which is the arthritis of 5 or more joints, (b) oligoarticular onset, which is the arthritis of 4 (or) less joints, and (c) systemic onset arthritis (any number of joints involved) with characteristic rash and at least 2 weeks of high spiking fever.

Reiter's Syndrome[4]

Reiter's syndrome is characterized by the triad of urethritis, conjunctivitis, and arthritis. It may follow acute infection, notably with *Shigella*, or may be sexually transmitted. Here, arthritis is often acute and self-limited and may demand only symptomatic therapy.

Arthritis associated with SLE[5]

SLE is a multi-system disease invariably associated with the presence of antinuclear antibodies (ANA) and often associated with antibodies reactive with DNA and with lowered level of serum hemolytic complements. The incidence of SLE in childhood is 0.6/1,00,000 children. 10% of the pediatric rheumatology clinic will have SLE patients. Girls are more frequently affected than boys. Fever and arthritis are common presenting manifestation of lupus. Nephritis, polyserositis, anemia, thrombocytopenia, myositis, organomegaly, and central nervous system involvement are all common. The arthritis of systemic lupus may mimic that of JRA; however, the arthritis of lupus is more often transient and is not associated with destructive joint changes.

Reactive Arthritis[6]

Reactive arthritis is characterized by an aseptic inflammatory articular involvement occurring in a genetically predisposed individual secondary to an infectious process localized outside the joint. Reactive arthritis usually refers to an acute or insidious oligoarthritis process after enteric infection. Several organisms all causing gastroenteritis have been associated with this type of reaction; these include *Salmonella*, *Shigella*, *Yersinia enterocolitis,* and *Campylobacter*.

Septic Arthritis[4]

It accounts for 6.5% of all childhood arthritis. The organisms most commonly isolated from children with septic arthritis were *Staphylococcus aureus* and *Hemophilus influenza*. *H. influenza* type B is the most common infection identified in children younger than 2 years of age. *Streptococcus pneumonia* is also frequent in children below 2 years of age. After 2 years of age, *S. aureus* becomes the most frequent organism. Septic arthritis usually arises from hematogenous spread from a focus of infection, elsewhere in the body.

Tuberculous Arthritis

Tuberculous arthritis typically arises on a background of pulmonary tuberculosis as an indolent, chronic monoarthritis often of the knee (or) wrist that result in

the extreme destruction of the joint and surrounding bones. A family or environmental history of pulmonary tuberculosis together with a positive Mantoux skin test should suggest the possibility of tuberculous arthritis.

Rheumatic Arthritis[4,6]

Acute rheumatic fever is common in 5 to 15 years of age. It is associated with poverty and crowding and is more common in urban than rural environments. Arthritis is the most common major manifestation of acute rheumatic fever occurring in approximately three-quarters of patients. The arthritis is typically polyarticular and migratory, most commonly affecting large joints in the lower extremities. Rheumatic arthritis is more common in boys than girls. Arthritis dramatically responds to aspirin and completely resolved within 3 weeks. There is no residual deformity of joints. Acute rheumatic fever is diagnosed using modified Jones criteria. Migratory polyarthritis is one of the major manifestations.

Post-Streptococcal Arthritis[4,6]

It follows infection with *Streptococcus* disease both Group A and G organisms. Although it may represent an incomplete form of acute rheumatic fever, it differs from rheumatic fever in the characteristics of arthropathy which tends to be either mono or polyarticular, and it affects small joints mainly and symptoms last for months.

Arthritis associated with malignancies of childhood[6]

Here, arthritis has been noted most frequently in childhood leukemia and neuroblastoma. It also occurs in lymphoma, Hodgkin's disease, malignant histiocytosis, and rhabdomyosarcoma. Affected joints are generally very painful. Extreme joint pain or tenderness or refusal to walk because of joint pain should always raise the suspicious of malignancy. One or many joints may be affected here. Arthritis may be transient, recurrent, or persistent.

Miscellaneous conditions associated with arthritis[6]

1. Mycoplasmal infection
2. Brucellosis
3. Arthritis associated with diabetes mellitus
4. Familial Mediterranean fever
5. Sarcoidosis
6. Cystic fibrosis
7. Pancreatitis
8. Acne form arthritis
9. Lyme disease.

MATERIALS AND METHODS

Study Design

It is a descriptive study condoler in a tertiary care hospital in Tamil Nadu over a period of 18-month.

Sample Specification

Inclusion criteria

All children between 6 months and 12 years of age who got admitted in the pediatric ward with arthritis were included in the study.

Exclusion criteria

Child with arthritis under specific treatment.

Description of manoeuvre

All children admitted with arthritis were subjected to detailed history and thorough clinical examination.

The following investigations were done in all cases.

1. Completed hemogram done by Coulter counter (hemoglobin, packed cell volume, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, platelet count, red blood cells and white blood cells count
2. Peripheral smear for morphology
3. Mantoux test
4. X-ray chest
5. Electrocardiography
6. Echocardiogram
7. Blood culture
8. Urine routine, 24 h urinary protein
9. Blood urea, sugar, serum creatinine, and liver function test
10. Antistreptolysin-O titer, erythrocyte sedimentation rate, and C-reactive protein.

Specific investigations, such as ANA, rheumatoid factor, anti-dsDNA, ophthalmic examination, HIV screening, muscle enzyme study, coagulation factor assay, bone marrow aspiration and biopsy, C3, C4 level, and coagulation factor assay, were performed for chronic type of arthritis when warranted.

RESULTS

Arthritis is one of most common, yet challenging problems with diverse pathology ranging from the benign with a good prognosis to the serious and ultimately fatal. So, pediatricians must know the common etiology for early diagnosis and prompt treatment.

In our study, 56 children with arthritis were studied.

Table 1 shows the most common age group to be involved was between 6 years and 12 years with 44 (78.54%) cases. Of this, 25 cases (44.64%) were in the age group of 9-12 years. Only 3 cases (5.35%) were found in the age group between 6 months and 2 years. Males were more affected than females. They constituted

30 (53.57%) of all cases with male:female ratio about 1.15:1 (Table 1).

Out of 56 cases, 23 (41.0%) cases of arthritis were due to rheumatic fever, which was more common in this study. Next to this was JRA, which comprises 37.5% (21 cases) of total. Septic arthritis comprises 12.5% of total arthritis. SLE, psoriatic arthritis, tuberculous arthritis, and post-streptococcal arthritis comprise 3.57%, 1.8%, 1.8%, and 1.8%, respectively (Table 2).

Among 43 cases of polyarthritis, 23 cases (53.4%) were due to rheumatic fever. 18 cases (37.2%) were due to JRA. In JRA, 11 cases (25.58%) were due to polyarticular onset type, 5 cases (11.62%) were due to systemic onset type. SLE comprises 4.6%[2] of total cases of arthritis (Table 3).

DISCUSSION

Arthritis in children may result from many conditions. These include septic arthritis, rheumatic fever arthritis, JRA, the spondyloarthropathies, lupus erythematosus, dermatomyositis, and the various vasculitis syndromes, malignancies all can cause arthritis, and the diseases are distinguished by their characteristic clinical appearances. It is important to make a prompt diagnosis to ensure appropriate management.

Table 1: Age and sex distribution of children with arthritis

Age in years	Sex, *N* (%)		Total *N* (%)
	Male	Female	
0.6-2	2 (66.6)	1 (33.3)	3 (5.35)
3-5	5 (55.5)	4 (44.5)	9 (16)
6-8	13 (68.4)	6 (31.57)	19 (33.9)
9-12	10 (40)	15 (60)	25 (44.64)
Total	30 (53.37)	26 (46.4)	56 (100)

Table 2: Distribution of various etiology in study group

Etiology	Number of cases (%)
Rheumatic fever	23 (41.0)
JRA	21 (37.5)
Septic arthritis	7 (12.5)
SLE	2 (3.57)
Psoriatic arthritis	1 (1.8)
Tuberculous arthritis	1 (1.8)
Post-streptococcal reactive arthritis	1 (1.8)
Total	56 (100)

JRA: Juvenile rheumatoid arthritis, SLE: Systemic lupus erythematosus

Table 3: Distribution of polyarthritis in study group

Causes of polyarthritis	*N* (%)
Rheumatic fever arthritis	23 (53.4)
Polyarticular onset JRA	11 (25.58)
Systemic onset JRA	5 (11.62)
SLE	2 (4.6)
Psoriatic arthritis	1 (2.3)
Post-streptococcal reactive arthritis	1 (2.3)
Total	43 (100)

JRA: Juvenile rheumatoid arthritis, SLE: Systemic lupus erythematosus

In our study done in a tertiary referral institution, we found 7 different etiologies for arthritis.

In our study, the diagnoses most frequently associated were rheumatic fever (41%), JRA (37.5%), and septic arthritis (12.5%). Less frequent was SLE (3.57%), psoriatic arthritis (1.8%), tuberculous arthritis (1.8%), and post-streptococcal reactive arthritis (1.8%).

In comparison, in the study by Frati Munari *et al.*,[7] the diagnoses most frequently established were pyogenic arthritis (45.9%), rheumatic fever (18.7%), and JRA (17%). Less frequent was tuberculous arthritis (5.8%), SLE (3.9%), hemophilic arthritis (2.1%), and other connective tissue diseases (1.5%).

Noah and De Ceulaer,[8] in their study, most frequent diagnosis established was juvenile chronic arthritis (28%), self-limiting arthritis (20%), rheumatic fever (15%), and SLE (12%).

In our study, septic arthritis cases number were less because most of septic arthritis occurred in the neonatal period. In our study, still rheumatic fever is the most common cause of arthritis. Next to this was JRA. Less frequent causes in our study and Frati Munari *et al.* was almost similar.

In this study, out of 23 cases of rheumatic fever, 21 (91.3%) were in the age group of 6-12 years and 2 (8.77%) were < 5 years of age. This was similar to the study by Nair *et al.*[9] where 10% cases reported were below the age of 5 years.

In our study, females outnumbered males in contrast to textbook description.[4] This variable was not able to compare with our studies.[9,10]

In this study, 30% of the cases had only arthritis as major criteria, and all of them presented with polyarthritis. In contrast, Carapetis and Currie[11] found 20% of monoarthritis.

In our study, out of 21 cases of JRA, males outnumbered with male:female ratio of 1.3:1. A similar observation has been made by Surjith *et al.*,[12] who reported a male:female ratio of 1.8:1. Another observation has been made by Pongpanich and Daengroongroj,[13] who reported a male:female ratio of 1.7:1. In our study, no cases occurred

below the age group of 2 years and 12 (57.1%) cases occurred in the age group of 9-12 years.

In our study, 2 female children presented with SLE and both of them had fever, rash, and anemia. Both of them showed positivity for ANA and anti-dsDNA. One among them had alopecia and oral ulcer. None of them had renal involvement.

In an analysis of the SLE cases of their study, Surjit *et al.*[12] reported 56% had fever, 50% had rash, 31.25% had renal involvement, 25% had oral ulcers, 12.5% had alopecia, and 12.5% had anemia. The positivity for ANA was 100%, and 72.7% showed positivity for anti-dsDNA.

In our study, 70% cases were in the age group below 5 years which is comparable to the study done by Wang *et al.*[14] Here, most of the cases were males in contrast to the other studies where males and females were affected equally.

In our study, synovial fluid culture was positive in 85.7% of the cases. Wang *et al.*[14] found 70.6% of positivity in synovial fluid. The organism most commonly isolated is *Staphylococcus,* which is comparable to other studies.

CONCLUSION

Arthritis is one of the common causes of morbidity in children. Etiological analysis is essential to guide the prognosis and treatment.

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