Original Research Article

International Journal of Medical and Health Research
ISSN: 2454-9142
www.medicalsciencejournal.com
Volume 1; Issue 4; November 2015; Page No. 154-156

Comparative evaluation of serum iron deficiency in rheumatoid arthritis patients and normal persons

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Abstract
Anaemia is a condition that causes a low red blood cell count and insufficient levels of hemoglobin, a protein that carries oxygen. Anaemia can cause symptoms that might add to the weakness and tiredness that people with rheumatoid arthritis sometimes experience. However, treatments are available to help reduce the symptoms of anaemia. According to some estimates, 30–70 percent of people with rheumatoid arthritis develop anaemia.

The study was planned in Narayan medical College and Hospital in Department of Medicine. The total 50 patient were selected and enrolled into the study. The 25 patients were identified with the RA condition and 25 patients were enrolled as normal patients. The different serum parameters like Haemoglobin, Serum iron, Serum Total iron binding capacity and Serum Ferritin were monitored in both study group patients.

There is no known prevention for rheumatoid arthritis (RA) other than the reduction of contributory factors. Therapy goals are to reduce pain and inflammation and improve quality of life. Surgery to repair, replace or fuse joints may help in serious conditions.

Keywords: rheumatoid arthritis, serum iron deficiency, RA, joints

Introduction

Rheumatoid arthritis (RA) is a long-term or chronic disease marked by symptoms of inflammation and pain in the joints. These symptoms and signs occur during periods known as flares. Other times are known as periods of remission — this is when symptoms dissipate completely.

Rheumatoid arthritis (RA) is a long-term autoimmune disorder that primarily affects joints. It typically results in warm, swollen, and painful joints. Pain and stiffness often worsen following rest. Most commonly, the wrist and hands are involved, with the same joints typically involved on both sides of the body. The disease may also affect other parts of the body. This may result in a low red blood cell count, inflammation around the lungs, and inflammation around the heart. Fever and low energy may also be present [1]. Often, symptoms come on gradually over weeks to months [2].

While the cause of rheumatoid arthritis is not clear, it is believed to involve a combination of genetic and environmental factors. The underlying mechanism involves the body's immune system attacking the joints. This results in inflammation and thickening of the joint capsule. It also affects the underlying bone and cartilage. The diagnosis is made mostly on the basis of a person's signs and symptoms [2]. X-rays and laboratory testing may support a diagnosis or exclude other diseases with similar symptoms [1]. Other diseases that may present similarly include systemic lupus erythematosus, psoriatic arthritis, and fibromyalgia among others [2].

The goals of treatment are to reduce pain, decrease inflammation, and improve a person's overall functioning. This may be helped by balancing rest and exercise, the use of splints and braces, or the use of assistive devices. Pain medications, steroids, and NSAIDs are frequently used to help with symptoms. Disease-modifying antirheumatic drugs (DMARDs), such as hydroxychloroquine and methotrexate, may be used to try to slow the progression of disease [1]. Biological DMARDs may be used when disease does not respond to other treatments. However, they may have a greater rate of adverse effects. Surgery to repair, replace, or fuse joints may help in certain situations [1]. Most alternative medicine treatments are not supported by evidence [3].

Arthritis of joints involves inflammation of the synovial membrane. Joints become swollen, tender and warm, and stiffness limits their movement. With time, multiple joints are affected (polyarthritis). Most commonly involved are the small joints of the hands, feet and cervical spine, but larger joints like the shoulder and knee can also be involved. Synovitis can lead to tethering of tissue with loss of movement and erosion of the joint surface causing deformity and loss of function [2].

RA typically manifests with signs of inflammation, with the affected joints being swollen, warm, painful and stiff, particularly early in the morning on waking or following prolonged inactivity. Increased stiffness early in the morning is often a prominent feature of the disease and typically lasts for more than an hour. Gentle movements may relieve symptoms in early stages of the disease. These signs help distinguish rheumatoid from non-inflammatory problems of the joints, such as osteoarthritis. In arthritis of non-inflammatory causes, signs of inflammation and early morning stiffness are less prominent. [citation needed] The pain associated with RA is induced at the site of inflammation and classified as nociceptive as opposed to neuropathic. The joints are often affected in a fairly symmetrical fashion, although this is not specific, and the initial presentation may be asymmetrical [4].

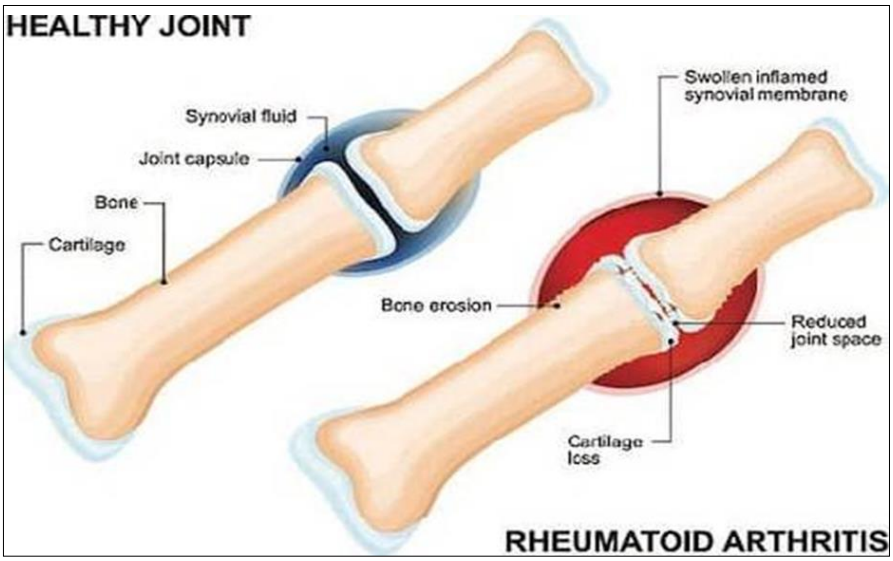

Fig 1: Rheumatoid Arthritis Condition

As the pathology progresses the inflammatory activity leads to Tendon tethering and erosion and destruction of the joint surface, which impairs range of movement and leads to deformity. The fingers may suffer from almost any deformity depending on which joints are most involved. Specific deformities, which also occur in osteoarthritis, include ulnar deviation, boutonniere deformity (also "buttonhole deformity", flexion of proximal interphalangeal joint and extension of distal interphalangeal joint of the hand), swan neck deformity (hyperextension at proximal interphalangeal joint and flexion at distal interphalangeal joint) and "Z-thumb." "Z-thumb" or "Z-deformity" consists of hyperextension of the interphalangeal joint, fixed flexion and subluxation of the metacarpophalangeal joint and gives a "Z" appearance to the thumb. The hammer toe deformity may be seen. In the worst case, joints are known as arthritis mutilans due to the mutilating nature of the deformities [5].

Anaemia is a condition that causes a low red blood cell count and insufficient levels of haemoglobin, a protein that carries oxygen. Anaemia can cause symptoms that might add to the weakness and tiredness that people with rheumatoid arthritis sometimes experience. However, treatments are available to help reduce the symptoms of anaemia. According to some estimates, 30–70 percent of people with rheumatoid arthritis develop anaemia.

Based on literature finding this study was planned with the aim to assess the iron deficiency in rheumatoid arthritis patients specially in the middle age patients.

Methodology

The study was planned in Narayan medical College and Hospital in Department of Medicine from June 2014 to Nov 2014. The total 50 patient were selected and enrolled into the study. The 25 patients were identified with the RA condition and 25 patients were enrolled as normal patients. The different serum parameters like Haemoglobin, Serum iron, Serum Total iron binding capacity and Serum Ferritin were monitored in both study group patients. The approval of the institutional ethical committee was taken prior to conduct of this study. All the patients were informed consent.

Inclusion criteria

1. Patients who satisfied the American Rheumatologic association criteria 1987, irrespective of haematological signs present or not.
2. Age group 30 to 55 years irrespective of sex.
3. Duration of disease up to 2 years.

Exclusion criteria

1. Previously diagnosed anaemia and treated
2. Previously have any other bleeding disorder not related to Rheumatoid arthritis.
3. Previously known malignancies, renal failure, haemolytic anaemia any other chronic blood loss like haemorrhoids.

Results & Discussion

The data was collected in the 25 normal patients and 25 rheumatoid arthritis patients and compared as below. The ball *et al*. detected a mild inflammatory reaction in the synovial membrane with some synovial membrane with some synovial proliferation five to eighteen hours after the iron dextran injection. The iron was in the form of ferritin and haemosiderin and persisted for these months after the injection [6]. Muirden and coworkers showed that synovial cells in culturecan ingest haemoglobin prepared from heamolysed red cells and the subsequent appearance of ferritin in these cells implied that they were able to synthesise apoferritin. The authors suggested that both the synthesis of ferritin and breakdown of Haemoglobin take place within the same lysosome and that iron from lysed erythrocytes is likely to be an important source of the iron deposits in the rheumatoid synovid [7]. Muirden and Senator suggested that iron deposits in Rheumatoid Arthritis arise from continued oozing of blood from the vascular granulation tissue into the synovial cavity [8]. In highly inflamed rheumatoid joints, simple bearing or the stress of motion may be the hyperplastic villi and synovial fold to bleeding. These large deposits only have a considerable contributory to anaemia and pathogenesis of this disease.

Iron-deficiency anaemia in patients with rheumatoid arthritis may be difficult to distinguish from the hypochromic, microcytic anaemia found in patients with any chronic

inflammatory or malignant disease in whom serum iron concentration and transferrin saturation are reduced but in whom iron stores are normal or increased [9]. The examination of bone marrow particles for iron deposits has therefore been accepted as the only valid means by which iron status can be evaluated in patients with rheumatoid arthritis. In normal subjects serum ferritin concentration correlates well with iron stores measured by the phlebotomy technique [10]. The relationship of serum ferritin concentration with stainable marrow iron in the present study indicates a similar association with body stores. The low serum iron concentration and transferrin saturation at all levels of storage iron again demonstrates the poor mobilization of reticuloendothelial iron characteristic of chronic inflammatory disease [11].

Table 1

S.N.	Variables	Control Group	Study Group
	No. of Patients	25	25
1	Hb (gm %)	12.1 - 14.2	8.72 ± 0.509
2	Serum Iron (mg/dl)	107.5 – 153.2	26.3 – 35.9
3	Serum TIBC (mg/dl)	311.5 – 372.6	88 – 137
4	Serum Ferritin (ng/ml)	108.9 – 140.1	18.7 – 43.6

Conclusion

There is no known prevention for iron deficiency anaemia in rheumatoid arthritis (RA) patients other than the reduction of contributory factors. Therapy goals are to reduce pain and inflammation and improve quality of life. Surgery to repair, replace or fuse joints may help in serious conditions.

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