

## STUDY OF BIOCHEMICAL MARKERS IN ARTHRITIS PATIENTS

Dr. Yogesh Shivmurti Khandalkar<sup>1</sup>, Dr. Vishal Supada Patil<sup>2</sup>, Dr. Ketan Ajay Kulkarni<sup>3</sup>, Dr. Harsh Arunkumar Raithatha<sup>4</sup>

<sup>1</sup>Senior Resident , Dr. D.Y.Patil Medical College and Hospital Pimpri Pune

<sup>2</sup>Associate Professor, Dr. D.Y.Patil Medical College and Hospital Pimpri Pune

<sup>3</sup>Junior Resident Dept of Orthopaedics Dr. D.Y.Patil Medical College and Hospital Pimpri Pune

<sup>4</sup>Junior Resident, Dept of Orthopaedics Dr. D.Y.Patil Medical College and Hospital Pimpri Pune

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**Corresponding author:** Dr. Vishal Supada Patil

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### Abstract

**Introduction:** The most prevalent kind of arthritis is osteoarthritis. It happens when joints are overworked and most commonly affects the elderly, although it can also affect persons who have had joint injuries or who are overweight. The weight-bearing joints, such as the knees, hips, foot, and spine, are the ones most prone to osteoporosis. It's a loss of cartilage that leads to inflammation and unpleasant motions. Arthritis is a disease that causes one or more joints to swell and become tender. The most typical symptoms of arthritis are joint pain and stiffness, which usually worsen with age.

**Aim:** Study of Biochemical Markers in Arthritis Patients

**Material and Method:** The study included 40 patients, 20 men and 20 females, ranging in age from 25 to 50 years old from Central India. All of the people in the study were healthy, with no congenital anomalies, inflammation, trauma, or orthopedic treatment.

**Result:** comparison between Arthritis female and Arthritis male subject's serum Anti CCP value are raised in Arthritis female subjects compare to male subjects the data show that statistically significant p-value are  $P < 0.01$ .

**Conclusion:** In Arthritis patients, Anti-CCP has become a key serologic marker. It can be utilized as a test for early identification of RA, differential diagnosis between RA and ASO other rheumatic or immunological disorders, prognosis prediction, and therapy outcome evaluation.

**Keywords:** Anti-CCP, Arthritis, Osteoarthritis, subchondral, ASO

### Introduction

Arthritis is a disease that causes one or more joints to swell and become tender. The most typical symptoms of arthritis are joint pain and stiffness, which usually worsen with age. The two most common types of arthritis are osteoarthritis and rheumatoid arthritis. Osteoarthritis causes cartilage, the stiff, slippery tissue that covers the ends of bones where they meet to create a joint, to tear away. Rheumatoid arthritis is a disease in which the immune system attacks the joints, beginning with the lining. Symptoms The most common signs and symptoms of arthritis are in the joints. Arthritis signs and symptoms differ based on the kind of arthritis: Pain Stiffness Redness Swelling The range of motion has been constrained.<sup>1</sup>

Early diagnosis of rheumatoid arthritis (RA) and vigorous therapy to decrease disease activity are now universally

recognised as having the best chance of preserving function and reducing disability. RA is a chronic inflammatory disease that causes polyarticular inflammation, synovitis, osteitis, and peri-articular osteopenia, as well as subchondral bone erosion and gradual joint space constriction. These characteristics frequently result in increasing joint degeneration, reduced function, and disability. Because half of RA patients become disabled within ten years of diagnosis, it's vital to start treating the condition as soon as possible to reduce inflammation and avoid bone and joint cartilage deterioration.<sup>2</sup> The extent or severity of disease activity, as determined by counting the number of swollen and tender joints, measuring patient-reported outcomes (for example, patient global quality of life assessment), and assaying acute phase responses, such as the erythrocyte sedimentation rate (ESR) and C-reactive

protein (CRP) levels, are commonly used to determine treatment. While inflammatory indicators are important in the clinic, markers that can accurately detect continuing bone and cartilage degradation may be more beneficial for evaluating therapy efficacy in real time. Various imaging modalities, such as hand and foot radiography, hand magnetic resonance imaging (MRI), and high-resolution ultrasonography of particular joints, have been used to assess joint inflammation and damage thus far. Other illnesses defined by joint and/or skeletal inflammation and injury are increasingly focusing on biochemical indicators of bone and cartilage turnover.<sup>3</sup>

**Types of Arthritis:** The most prevalent kind of arthritis is osteoarthritis. It happens when joints are overworked and most commonly affects the elderly, although it can also affect persons who have had joint injuries or who are overweight. The weight-bearing joints, such as the knees, hips, foot, and spine, are the ones most prone to osteoporosis. It's a loss of cartilage that leads to inflammation and unpleasant motions. Treatment and pain management are very achievable, and something we at Carolina Arthritis Associations accomplish on a daily basis. Reduce the amount of work the injured joint has to do, physical therapy and exercise motions, prescribed pain relief medication, dietary changes, and warmth and ice can all be part of our prescription. Rheumatoid arthritis is an inflammatory illness in which the immune system assaults bodily components, particularly the joints. The specific etiology of rheumatoid arthritis is unknown. Some believe the immune system becomes "confused" after an infection or virus; while others believe substances in the body induce it. In any case, this condition can strike abruptly or gradually, producing pain, stiffness, and edema in various joints. Swelling can progress to the point when routine tasks like opening a jar, going on a stroll, or driving a car become difficult, if not impossible. Our treatment regimens at Carolina Arthritis Association may include various drugs to minimize inflammation and prevent joint degeneration. New advancements have made it feasible to do more than ever before, particularly with vigorous and early intervention. If you believe you may have this condition, schedule an appointment right away. The skin and joints are affected by psoriatic arthritis. Psoriasis causes patchy, elevated regions of the skin to emerge, which burn and itch. Psoriatic arthritis, which can cause swelling in the fingers and toes, affects around a third of those who have this skin condition. This form of arthritis commonly strikes people between the ages of 30 and 50, and it affects both men and women equally. Psoriatic arthritis is best diagnosed by a rheumatologist who is familiar with the disease's various nuances. The need of a thorough review of your medical history as well as a thorough physical examination with specific focus to the

joints, skin, and nails cannot be overstated. Your rheumatologist can create a treatment plan for you if you've been diagnosed with psoriatic arthritis. The ultimate result of nucleic acid metabolism is uric acid. Gout has long been linked to high blood uric acid levels. Gouty arthritis (gout) is a medical illness marked by red, sensitive, hot, and swollen joints as a result of recurring acute inflammatory arthritis episodes. Gout prevalence in the United States has risen from 2.9 cases per 1,000 people in 1990 to 5.2 cases per 1,000 people in 1999, owing to the population's growing age. Due to greater baseline levels of blood uric acid, males have a higher chance of getting gout than women. Gout is caused by an increase in blood uric acid levels, which causes crystal formation in joints, tendons, and other tissues, as well as uric acid kidney stones.<sup>4</sup>

Hyperuricemia is described as uric acid levels in the blood that are higher above the typical reference interval. Hyperuricemia is defined as a uric acid content in the blood that is more than 7.0 mg/dL in men and 6.0 mg/dL in women in adults. Uric acid is eliminated in urine in healthy people. However, renal illness can limit uric acid excretion, resulting in hyperuricemia. Hyperuricemia can also be seen in newborns who have fewer nephrons. When compared to healthy controls, these newborns metabolise less uric acid and/or get excessive uric acid from their mothers. Chemotherapeutic treatments for illnesses like leukaemia and lymphoma generate a significant rise in the excretion of uric acid as a result of nucleic acid metabolism, which can block renal tubules and lead to acute renal failure.<sup>5</sup>

## **Aim**

Study of Biochemical Markers in Arthritis Patients

## **Material and Method**

The study included 40 patients, 20 men and 20 females, ranging in age from 25 to 50 years old from Central India. All of the people in the study were healthy, with no congenital anomalies, inflammation, trauma, or orthopedic treatment. The study conducted in the Department of Orthopedic. Patients went directly to the Observed Treatment Short-course focus in the Dept. of Orthopedic, Maharashtra.

## **Sample Collection**

5ml of each patient's blood sample was taken and separated in plain tube. The sample was used to estimate the levels of alkaline phosphates, ASO, CCP, Uric acid, calcium, phosphorus, and RA test

## **Biochemical Analysis**

The sample was used to estimate the levels of alkaline phosphates, ASO, CCP, Uric acid, calcium, phosphorus, RA test, were estimated on AU480 Analyze.

**Result:****Table 1: comparison between Arthritis female and Arthritis male subject's**

Parameters	Arthritis Female subjects (n-20)	Arthritis Male subjects Male (n-20)	P-value
RA (IU/ml)	87.4±5.4	22.3±2.1	P < 0.0001
ASO (Todd units)	231.6±10.3	97.2±2.9	P < 0.0001
CCP (EU/ml)	42.3±3.26	29.3±4.30	P < 0.0001
URIC ACID (mg/dl)	4.21±1.23	5.23±1.07	P = 0.0040
CALCIUM(mg/dl)	8.9 ± 0.6	9.4 ± 0.2	P = 0.0011
PHOSPHORUS(mg/dl)	5.0 ± 0.7	4.0 ± 0.2	P < 0.0001
ALP(Iu/l)	148.3 ± 29.9	97.6 ± 21.3	P < 0.0001

Table 1 show that comparison between Arthritis female and Arthritis male subject's serum RA and serum ASO value are raised in Arthritis female subjects compare to male subject's the data show that statistically significant p-value are P < 0.01

comparison between Arthritis female and Arthritis male subject's serum Anti CCP value are raised in Arthritis female subjects compare to male subjects the data show that statistically significant p-value are P < 0.01

comparison between Arthritis female and Arthritis male subject's serum PHOSPHORUS and serum ALP value are raised in Arthritis female subjects compare to male subjects the data show that statistically significant p-value are P < 0.01

comparison between Arthritis female and Arthritis male subject's serum calcium and serum uric acid value are normal in Arthritis female subjects and male subjects the data show that statistically not-significant p-value are P > 0.01

**Discussion**

In RA, a number of variables, including systemic inflammation, corticosteroid usage, and menopause, may have an impact on bone resorption, bone turnover, and skeletal condition over time. Because the lack of osteoclasts or osteoclast activity leads to a reduction in bone resorption but only minor impacts on cartilage degradation, activated osteoclasts play a role in altered bone balance. The involvement of cathepsin K in RA has been widely researched, although the results are mixed. Although cathepsin K does not appear to be the principal enzyme promoting bone deterioration in RA, its levels are elevated, indicating that it can be utilised as a diagnostic. CTX-I levels only have a limited relationship with joint damage in RA, and are likely driven by skeletal structure loss/osteopenia/OP, which is also common in the disease. MMPs are also involved in bone loss caused by inflammation. Studies that reveal an increase in the MMP-derived collagen type I fragment ICTP in RA might imply

that osteoclasts are causing MMP-mediated matrix breakdown in these conditions. Treatment with infliximab and tocilizumab has been demonstrated to lower ICTP levels as well as osteoclast counts, which is consistent with MMP-mediated bone destruction by osteoclasts in RA. However, there has yet to be established a direct relationship between ICTP production and osteoclasts. To summarise, an inflamed joint is made up of many tissues, each of which is vulnerable to degradation and dysregulated collagen and matrix metabolism, as opposed to a normal joint, where the balance between production and degradation is closely regulated. Changes in biochemical markers caused by dysregulated metabolism may be beneficial for detecting changes in response to therapy early enough to prevent joint injury and bone loss in RA patients.<sup>6</sup>

Because standard clinical and laboratory parameters provide insufficient information to guide treatment decisions, several of the biomarkers studied in RA have been tested in other inflammatory joint diseases, particularly spondyloarthritis (SpA), on the theory that these disorders may share aspects of pathophysiology with RA. Biomarkers that reflect disease activity and predict structural development have piqued researchers' interest in AS. Because these markers are increased in only around half of ankylosing spondylitis (AS) patients, CRP and ESR do not have the sensitivity of RA in terms of disease activity. They also exhibit low associations with clinical indices of disease activity, unlike RA, despite significant correlations with MRI evidence of inflammation in the spine. They do not appear to predict structural damage progression, unlike RA, although CRP does predict clinical response to anti-TNF medication, as does RA.<sup>7</sup>

As a result, avoiding permanent joint loss requires identifying individuals with continuing joint injury and ensuring that therapy is reducing cartilage deterioration and restoring bone balance. Biological indicators and clinical measurements, such as high CRP levels and the number of swollen and sore joints, can be utilised to assist identify this group of individuals. Additional use of biochemical

markers that can sensitively identify continuing joint deterioration should aid with the right use of targeted treatment in RA patients and slow the course of joint damage.<sup>8</sup>

The discovery of novel biomarkers with significant therapeutic usefulness is still a hot area in RA research. Anti-MCV determination, along with RF and anti-CCP, has proven to be a valuable technique in the early stages of RA diagnosis. The 14-3-3 eta protein, which has been integrated into the IdentRA test, along with anti-CCP and RF for the diagnosis of RA, has joined them. It's also known as JOINT stat and can be used on its alone. In the United States and Canada, these two tests are currently accessible. The MBDA score was created to allow for more effective disease monitoring. It is offered for physicians under the name Vectra DA and employs the determination of several biomarkers implicated in the aetiology of the RA chain. Rheumatoid factor (RF) and antibodies against cyclic citrullinated proteins are currently used in the ACR/EULAR 2010 criteria for RA diagnosis (anti-CCP). Other diagnostic biomarkers that can aid in the early identification of RA have also been discovered.<sup>9</sup>

In horse osteoarthritis, Fuller et al.<sup>10</sup> found a link between synovial bone-specific ALP levels and cartilage degradation. Despite the fact that serum ALP level has been identified as a key biochemical marker for assessing disease activity in ankylosing spondylitis and rheumatoid arthritis, we think this is the first study to indicate a link between serum ALP level and osteoarthritis in the general population. Second, high ALP levels in the blood may be linked to persistent pain. In older women with lower back discomfort, that serum bone specific ALP levels were significantly higher. Participants with severe knee osteoarthritis were shown to be more likely to suffer discomfort in this research. Pain-induced chronodisruption may be linked to the severity of osteoarthritis, at least in part. It is generally known that chronic pain can cause sleep disturbances, which are directly linked to changes in the circadian cycle. As previously stated, higher blood ALP levels were linked to higher levels of inflammatory mediators such as CRP and leukocyte counts. Furthermore, metabolic instability, inflammatory pathways, and the daily rhythmic environment have all been linked to osteoarthritis susceptibility via neuroendocrine systems such as cortisol and parathyroid hormone, according to Berenbaum et al.<sup>12</sup>

### Conclusion

In Arthritis patients, Anti-CCP has become a key serologic marker. It can be utilized as a test for early identification of RA, differential diagnosis between RA and ASO other rheumatic or immunological disorders, prognosis prediction, and therapy outcome evaluation. And also serum calcium, serum phosphorus and serum alkaline

phosphatase are also some changes in arthritis subject but not specific markers in arthritis.

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