Original Research Article

Study of Calcium and Phosphorus Levels in Patients with Rheumatoid Arthritis

Dr. Vinay Kumar Agarwal[1*], Dr. Neha Karnani[2], Dr. Raman Raj[3]

[1*]Assistant Professor, Dept. of General Medicine, ICARE Institute of Medical Sciences & Research & Dr. Bidhan Chandra Roy Hospital, Haldia.

[2]Assistant Professor, Dept. of General Medicine, ICARE Institute of Medical Sciences & Research & Dr. Bidhan Chandra Roy Hospital, Haldia.

[3]Assistant Professor, Dept. of General Medicine, ICARE Institute of Medical Sciences & Research & Dr. Bidhan Chandra Roy Hospital, Haldia.

***Corresponding Author:** Dr. Vinay Kumar Agarwal

*Assistant Professor, Dept. of General Medicine, ICARE Institute of Medical Sciences & Research & Dr. Bidhan Chandra Roy Hospital, Haldia.

ABSTRACT

Background: The cause of the chronic multisystem illness known as rheumatoid arthritis is unknown. The hallmark of RA is persistent inflammatory synovitis, which typically affects the peripheral joints in a systemic distribution, despite the disease's wide range of systemic manifestations. The hallmark of the diseases is the potential for synovial inflammation to result in bone erosion and cartilage damage, which would then alter the integrity of the joints.
Aim and Objectives: To study the serum levels of calcium and phosphorus and their ratio in Rheumatoid Arthritis patients.
Materials and Methods: This is a prospective, comparative study in which 100 RA patients and 100 healthy persons without RA as controls were included in this study. The serum levels of calcium and phosphorus were studied and compared for both the groups.
Results: Serum levels of calcium and calcium/phosphorus ratio were decreased and the estimated serum Calcium/Phosphorus ratio in cases is **1.62±0.25** as compared to control **2.75± 0.75**.
Conclusion: The decrease in the ratio of calcium to phosphorus in the blood suggests that RA patients have abnormal metabolisms of these both elements.

Key-words: Rheumatoid Arthritis, Calcium, Phosphorus.

INTRODUCTION:

A chronic systemic inflammatory disease, rheumatoid arthritis (RA) primarily affects the joints, causing a non-suppurative, proliferative, and inflammatory synovitis that frequently leads to arthritis and ankylosis of the joint. It is unclear exactly why bone erosion and joint deformities occur. The metabolic alterations that occur in RA are still of interest. Using these fundamentals, a study was conducted to determine the serum calcium/phosphorus ratio in patients with RA. It can also affect many other tissues and organs, including the skin, blood vessels, heart, lungs, and muscles.(2) It impacts roughly 1% to 2% of the overall population.(1) The etiology of RA is uncertain. Currently, there are a few theories regarding the pathophysiology of RA: a) autoimmune reactions; b)

mediators of tissue injury; c) genetic susceptibility; and d) trigger-triggering antigens. [2] Both organic and inorganic material can be found in bone. The majority of the inorganic or mineral component is crystalline hydroxyapatite, while the majority of the organic matter is protein. Bone contains about 99% of the body's calcium and 85% of its phosphorus. [3,4]

AIM AND OBJECTIVES: The objective of the present study is study and compare the levels and ratio of serum calcium and phosphorus in Rheumatoid Arthritis patients.

MATERIALS AND METHODS: The present study was conducted at our tertiary care hospital in the Dept. of General Medicine, ICARE Institute of Medical Sciences & Research & Dr. Bidhan Chandra Roy Hospital, Haldia. We included a total of 200 subjects, 100 were RA patients and 100 were healthy controls.

Study design: Prospective, case control, comparative hospital-based study.

Sample size: 200

Inclusion Criteria: This study included RA patients from the OPD of the Dept. of General Medicine

Exclusion Criteria: Patients with osteoarthritis, tubercular arthritis, arthritis other than RA, cardiovascular disorders and chronic kidney disorders.

RESULTS:

Table 1: Levels of serum Calcium, Phosphorus & Calcium/Phosphorus ratio in patients with RA and healthy controls

	N	Calcium (mg/dl)	Phosphorus (mg/dl)	Calcium/ Phosphorus
Cases	100	7.14 ± 0.84	5.75±0.85	1.62±0.25
Controls	100	9.35 ± 0.79	3.86 ± 0.75	2.75± 0.75
Mean difference		2.21	1.89	1.13
p-value		< 0.001, HS	< 0.001, HS	< 0.001, HS

In comparison to healthy controls, patients with RA showed statistically significant increases in phosphorous levels and decreases in serum levels of calcium and the calcium/phosphorus ratio with a highly significant p-value(<0.001)

DISCUSSION & CONCLUSION:

The results of the statistical analysis indicate that there is a significant difference (p<0.001) between the levels of phosphorus and serum calcium as well as the calcium/phosphorus ratio, when comparing RA patients to healthy controls. These findings align with the findings of multiple other studies. [4,5,6,7,8,9].

The accumulation of chronic inflammatory cells next to bone and the ensuing bone degradation are linked to RA. Free radicals produced from oxygen might play a significant role in bone resorption. [11]

Low calcium can result from both accelerated osteoporosis and a protracted, insufficient calcium diet. Patients with RA are susceptible to osteoporosis brought on by steroids and related to the disease. Our population's high salt consumption may make calcium deficiency worse. The place where calcium and sodium absorb options are connected is the proximal tubule. Many disabled

people rely heavily on pre-packaged food and meals, a large portion of which is high in sodium, despite this fact not being specifically studied. [10]

The primary malabsorption process in RA may result in reduced calcium absorption. This is supported by evidence from the following sources: [12] prolonged inadequate intake; [10] drug effects on calcium metabolism; and (8) decreases in mean total body calcium levels in RA patients not receiving corticosteroid medication. [5,13]

We would like to conclude that additional research on dietary management of calcium and phosphorus is required, as patients' serum levels of calcium and calcium/phosphorus decreased.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest

REFERENCES:

1. Doherty M, Lanyon P, Ralston SH. Musculoskeletal Disorders. In: Christopher Haslett, Chilvers ER, Boon NA, Colledge NR, editors. Davidson's Principles and Practice of Medicine. 19th edn. New York: Churchill Livingstone; 2002:p.1002-1007.
2. Andrew E, Rosenberg MD. Bones, Joints and Soft Tissue Tumours. In: Kumar, Abbas, Fausto, editors. Robbins and Cotran Pathologic Basis of Disease. 7th edn: Saunders.
3. Bringhurst FR, Demay MB, Krane SM, Kronenberg HM. Bone and Mineral Metabolism Health and Disease. In: Kasper, Braunwald, Fauci, Hauser, Longo, Jameson, editors. Harrison's Principles of Internal Medicine. 16th edn. Vol. 2. New York: McGraw Hill Medicine; 2008:p.2240-2244. 007:p.1305-1309
4. M, Lanyon P, Ralston SH. Musculoskeletal Disorders. In: Christopher Haslett, Chilvers ER, Boon NA, Colledge NR, Editors Davidson's Principles and Practice of Medicine. 19th edn. New York: Churchill Livingstone; 2002:p.1002-1007.
5. Andrew E, Rosenberg MD. Bones, Joints and Soft Tissue Tumours. In: Kumar, Abbas, Fausto, editors. Robbins and Cotran Pathologic Basis of Disease. 7th edn: Saunders.
6. Bringhurst FR, Demay MB, Krane SM, Kronenberg HM. Bone and Mineral Metabolism Health and Disease. In: Kasper, Braunwald, Fauci, Hauser, Longo, Jameson, editors. Harrison's Principles of Internal Medicine. 16th edn. Vol. 2. New York: McGraw Hill Medicine; 2008:p.2240-2244. 007:p.1305-1309
7. Walwadkar SD, Suryakar AN, Katkam RV, Kumbar KM, Ankush RD. Oxidative stress and calcium-phosphorus levels in rheumatoid arthritis. Indian J Clin Biochem 2006;21(2):134-137.
8. Scott DL, Farr M, Howkins CF, Wilkinson R, Bold AM. Serum calcium levels in rheumatoid arthritis. Ann Rheum Dis 1981;40:580-583.
9. Ropes MW, Rossmeisl EC, Bauer W. Calcium and phosphorus metabolism in rheumatoid arthritis and degenerative joint disease. Research Paper from Harvard Medical School, Boston P.785-789.
10. Bramble MG, Blake DR, White T, Sly J, Kerr DN. Ionised calcium in rheumatoid arthritis: effect of non-steroidal anti- inflammatory drugs. Br Med J 1980;281:840-841.
11. Verstraeten A, Dequeker J. Mineral metabolism in postmenopausal women with active rheumatoid arthritis. J Rheumatol 1986;13(1):43-46.
12. Sambrook N, Abeyasekera G, Ansell BM, Foster S, Gumpel N, Jeeve HJ et al. Calcium absorption in rheumatoid arthritis. Ann Rheum Dis 1985;44:585-588
13. Moorehead W.R, Briggs HC. Clinical Chem 1974;20:1458.