# SAR Journal of Medical Case Reports

Abbreviated Key Title: *SAR J Med Case Rep*
Home page: https://sarpublication.com/journal/sarjmcr/home
DOI: https://doi.org/10.36346/sarjmcr.2025.v06i02.001

ISSN 2707-7780 (P)
ISSN 2709-6947 (O)

**Original Research Article**


# Assessment of Some Haematological Markers and Renal Function in Patients with Rheumatoid Arthritis in Imo State, Nigeria


**Iheanacho Malachy C[1], Ononye Michael E[2], Aloy-Amadi Oluchi C[2*], Ogunnaya Frances U[3]**
[1]Department of Haematology and Blood Transfusion, Federal Teaching Hospital, Owerri, Nigeria
[2]Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria
[3]Department of Internal Medicine, Newark Beth Israel Medical Center, Newark, NJ, USA

***Corresponding Author:** Aloy-Amadi Oluchi C
Department of Medical Laboratory Science, Imo State University, Owerri, Nigeria



**Article History:** | Received: 06.02.2025 | Accepted: 14.03.2025 | Published: 12.04.2025 |



**Abstract:** Rheumatoid Arthritis (RA) is a chronic autoimmune disease that primarily affects the joints. In RA, the body's immune system mistakenly attacks its own tissues, especially the synovial membrane causing inflammation, pain, swelling, and stiffness. This study was aimed at determining changes in some haematological markers and renal profile in rheumatoid arthritis patients attending Imo State Specialist Hospital Umuguma, Owerri, Imo State. A cross-sectional study was carried out from the month of June to September, 2023, and all eligible subjects who gave a written informed consent and completed the questionnaire enrolled in the study. The study population consisted of 50 rheumatoid arthritis and an equivalent number of age-matched healthy subjects (50), who served as the controls. The procedure was carried out at the Specialist Hospital, Umuguma, Owerri. Ten millilitres of venous blood sample was collected at the ante-cubital vein aseptically, 5ml was dispensed into ethylenediaminetetraacetic acid (EDTA) containers for the estimation of haematological parameters, while the remaining 5mls was dispensed into plain containers for the determination of biochemical parameters. The samples in the containers were properly labeled with the subject's name, sample number and date of collection. The blood dispensed into the EDTA containers was stored in a refrigerator at $4^0$C while the serum was stored in a freezer at $-20^0$C prior to use. Haematological parameters and renal profile test were determined using standard laboratory procedure. The results of the tests were analyzed using SPSS version 21. The mean values of haemoglobin (9.84±1.32) g/dl and PCV (30.97±2.43) % were significantly lower in rheumatoid arthritis patients when compared to controls (12.48±1.57) g /dl and (33.20±4.57) %, while platelets (33844.00±102083) cells/ul were significantly higher in rheumatoid arthritis patients when compared to controls (234180.00±132329.01). There was no significant difference in the mean value of creatinine (1.35±1.98) mg/dl, in rheumatoid arthritis patients when compared to controls (1.34±1.86) mg/dl. The mean values of urea (37.56±20.88) mg/dl, sodium (151.02±44.78) mmol/l and potassium (4.94±2.08) mmol/l were significantly raised in rheumatoid arthritis when compared to controls (26.27±15.16) mg/dl, (132.27±5.98) mmol/l and (4.76±1.19) mmol/l (p=0.012, p=0.001, p=0.026, p=0.010. There was a non-significant positive correlation of PCV with urea, creatinine, sodium and potassium in rheumatoid arthritis patients (r=0.04, p=0.767; r=0.10, p=0.474; r=0.01, p=0.975 and r=0.03, p=0.834). Early detection and management of anemia, thrombocytosis, and renal dysfunction are essential for improving patient outcomes and quality of life.



**Keywords:** Haemoglobin, Packed Cell volume, Platelets, Sodium, Potassium, Urea, Creatinine, Rheumatoid Arthritis.




## 1. INTRODUCTION

Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterized by persistent synovial inflammation, leading to joint destruction and systemic manifestations. Hematological abnormalities, such as anemia and thrombocytosis, are frequently observed in RA patients and can serve as indicators of disease activity and severity. Additionally, renal involvement, though less common, poses significant morbidity risks in RA [1].

Anemia is prevalent among RA patients, often resulting from chronic inflammation that suppresses

erythropoiesis and alters iron metabolism [2]. Thrombocytosis, or elevated platelet counts, is another hematological manifestation associated with active RA and systemic inflammation [3]. Moreover, renal dysfunction in RA can arise due to chronic inflammation, medication toxicity, or secondary amyloidosis, leading to impairments in glomerular filtration and electrolyte imbalances [4].

This study aims to assess specific hematological markers: hemoglobin concentration, packed cell volume (PCV), and platelet count and renal function markers: serum urea, creatinine, sodium, and potassium levels in RA patients compared to healthy controls. Alterations in these parameters will provide insights into the systemic effects of RA and aid in comprehensive patient management.

## 2. MATERIALS AND METHODS

### 2.1 Study Area

The study was carried out at Imo State Specialist Hospital, Umuguma Owerri, Imo State, Nigeria.

### 2.2 Study Design

This was a cross-sectional study carried out at Imo specialist hospital, Umuguma, Owerri, Nigeria. All eligible subjects who gave a written informed consent and filled the questionnaire were enrolled in the study. The study population consisted of 50 rheumatoid arthritis patients and an equivalent number of aged-matched healthy subjects who served as controls. The results of the tests were analyzed using SPSS version 21.

### 2.3 Sample Collection

Ten millilitres of venous blood sample was collected at the ante-cubital vein aseptically, 5ml was dispensed into ethylenediaminetetraacetic acid containers for the estimations of haemoglobin, packed cell volume and platelet counts, while 5ml was dispensed into plain containers for the determination of biochemical parameters. The EDTA and plain container was properly labeled with the subject's name, sample number and date of collection. The blood dispensed into the EDTA container was stored in a refrigerator at $4^0$C while the serum was stored in a freezer at $-20^0$C prior to use.

### 2.4 Ethical Consideration

The study was approved by the ethical review committee of Imo specialist hospital, Umuguma, Owerri. All study participants who gave their informed consent were enrolled in this study before sample collection.

### 2.5 Laboratory Analysis

The haemoglobin, packed cell volume and platelet count were determined using manual methods. Serum urea was done using the diacetyl monoxime method. Creatinine was estimated using the Jaffe-Slot method, while sodium and potassium were determined using flame photometry.

### 2.6 Statistical Analysis

The statistical analysis was conducted to evaluate differences in hematological and renal parameters between rheumatoid arthritis (RA) patients and healthy controls, as well as to assess potential associations among these parameters. Continuous variables, such as hemoglobin concentration, packed cell volume (PCV), platelet count, serum urea, creatinine, sodium, and potassium levels, were summarized using means and standard deviations. Independent samples t-tests were employed to compare the means of continuous variables between RA patients and healthy controls. To determine if gender had an impact on the studied parameters within the RA cohort, independent samples t-tests were also used to compare males and females. Pearson's correlation coefficients were calculated to explore the relationships between PCV and renal function markers (serum urea, creatinine, sodium, and potassium) within the RA patient group. This analysis identifies the strength and direction of linear relationships between variables. A p-value of less than 0.05 was considered statistically significant for all tests, indicating strong evidence against the null hypothesis and suggesting that the observed differences or associations are unlikely due to chance.

## 3. RESULTS

The mean values of haemoglobin (9.84±1.32)g/dl and PCV (30.97±2.43) % were significantly lower in rheumatoid arthritis patients when compared to controls (12.48±1.57)g/dl and (33.20±4.57)% respectively (t =4.79, p= 000, t= 1.42, p= 0.001. Platelet (338450.00±102083) cells/µl was significantly increased in rheumatoid arthritis patients when compared to control. (234180.00±102083) cells/ul (t = 0.45, p= 0.001).

**Table 1: Mean Values of Hb, PCV, and Platelets in Patients with Rheumatoid Arthritis and Controls**

| Parameter | Test N 50 | Control N=50 | t-value | p-value |
|---|---|---|---|---|
| Hb (g/dl) | 9.84±1.32 | 12.48±1.57 | 4.79 | 0.000* |
| PCV (%) | 30.97±2.43 | 33.20±4.57 | 1.42 | 0.001* |
| Platelet (cells/µl) | 338450.00±102083 | 234180.00±132329.01 | 0.45 | 0.001* |

**Key:** Hb: Haemoglobin; PCV: Packed cell Volume; *: Significant p value

There was no significant difference in the mean value of creatinine in rheumatoid arthritis (1.35±1.98) mg/dl patients when compared to controls (1.34±1.86) mg/dl (t= 0.23, P=0 0.201).

The mean values of urea (37.56±20.88)mg/dl, Sodium (151.02±44.78) mmol/l and potassium (4.94±2.08) mmol/l were significantly higher in rheumatoid arthritis patients when compared to controls (26.27±15.16)mg/dl, (132.27±5.98)mmol/l and (4.76±1.19)mmol/l.(t=0.22, P=0.012, t= 2.19, p=0.012, t=2.19, p=026, t=0.08, p=0.010).

**Table 2: Mean Values of Urea, Creatinine, Sodium and Potassium in Patients with Rheumatoid Arthritis and Controls**

| Parameter | Test N = 25 | Control N = 25 | t-value | p-value |
|---|---|---|---|---|
| Urea (mg/dl) | 37.56±20.88 | 26.27±15.16 | 0.22 | 0.012* |
| Creatinine (mg/dl) | 1.35±1.98 | 1.34±1.86 | 0.23 | 0.201 |
| Sodium (mmol/l) | 151.02±44.78 | 132.27±5.98 | 2.19 | 0.026* |
| Potassium (mmol/l) | 4.94±2.08 | 4.76±1.19 | 0.08 | 0.010* |

**Key**: *Significant p value

There was no significant differences in the mean values of Hb (9.37 ±1.14) g/dl, PCV (30.18±2.76)%, platelets(3484770.10±111089)cells/ul, Urea (34.56±24.05)mg/dl, creatinine (1.43±1.42)mg/dl, sodium (149.02±47.65) mmol/l and potassium (4.54± 2.54)mmol/l in male patients with rheumatoid arthritis when compared to females: Hb( 8.38±1.49)g/dL, PCV (29.15±2.90)%, platelets (336470.00±162083) cells/ul, Urea (35.56±21.78)mg/dl, creatinine (1.15±1.18)mg/dl.

**Table 3: Comparison of the Mean Values of Hb, PCV, Platelet, Urea, Creatinine, Sodium and Potassium in Male Patients with Rheumatoid Arthritis and Females**

| Parameter | Male N=25 | Female N=25 | t-value | p-value |
|---|---|---|---|---|
| Hb (g/dl) | 9.37±1.14 | 8.38±1.49 | 2.65 | 0.321 |
| PCV (%) | 30.81±2.76 | 29.15±2.90 | 2.45 | 0.218 |
| Platelet (cells/µl) | 3484770.10±111089 | 336470.00±162083 | 2.43 | 0.483 |
| Urea (mg/dl) | 34.56±24.05 | 35.56±21.78 | 1.05 | 0.541 |
| Creatinine (mg/dl) | 1.43±1.42 | 1.15±1.18 | 0.71 | 0.321 |
| Sodium (mmol/l) | 149.02±47.65 | 151.12±44.78 | 0.58 | 0.403 |
| Potassium (mmol/l) | 4.54±2.54 | 4.12±2.32 | 0.41 | 0.217 |

**Key:** Hb: Haemoglobin; PCV: packed cell volume

PCV had a non - significant positive correlation with urea, creatinine, sodium, and potassium in rheumatoid arthritis patients (r=0.04, p=0.767, r=0.10, p=0.474, r=0.01, p=0.975 and r=0.03, p=0.834).

**Table 4: Correlation of PCV with Urea, Creatinine, Sodium and Potassium in Patients with Rheumatoid Arthritis**

| Variable | N | r | p-value |
|---|---|---|---|
| Urea | 50 | 0.04 | 0.767 |
| Creatinine | 50 | 0.10 | 0.474 |
| Sodium | 50 | 0.01 | 0.975 |
| Potassium | 50 | 0.03 | 0.834 |

## 4. DISCUSSION

Rheumatoid Arthritis (RA) is a chronic systemic inflammatory disease where assessment of disease activity is essential for management of patients. The findings from this study revealed that RA patients had significantly lower hemoglobin concentrations and PCV levels compared to healthy controls, indicating the presence of anemia. This aligns with existing literature, where anemia is a common extra-articular manifestation of RA, often attributed to chronic disease processes that impair erythropoiesis and iron utilization [2].

Elevated platelet counts observed in RA patients in this study are consistent with other research highlighting thrombocytosis as a marker of inflammation in RA. Increased platelet production correlates with disease activity and may contribute to the pro-inflammatory state observed in these patients [3].

Regarding renal function, the study noted significantly higher serum urea, sodium, and potassium levels in RA patients compared to controls, while serum creatinine levels showed no significant difference. Elevated urea levels may indicate reduced renal clearance or increased protein catabolism associated with

chronic inflammation [4]. The observed electrolyte imbalances, such as hypernatremia and hyperkalemia, could result from renal tubular dysfunction or medication effects commonly seen in RA management [5]. The lack of significant difference in serum creatinine levels suggests that glomerular filtration rate may remain relatively preserved in these patients, or that creatinine alone is not a sensitive marker for early renal impairment in RA [6].

No significant differences were found in the studied parameters between male and female RA patients, indicating that these hematological and renal alterations are likely related to the disease process itself rather than gender-specific factors.

The non-significant positive associations between PCV and renal function markers (urea, creatinine, sodium, and potassium) observed in this study suggest a potential link between anemia severity and renal involvement in RA. However, these associations did not reach statistical significance, indicating that further research with larger sample sizes is necessary to elucidate these relationships.

## 5. CONCLUSION

Rheumatoid arthritis is associated with significant decrease in the levels of haemoglobin and PCV, and a significant increase in the mean values of platelets, sodium, potassium, urea, and no effect on creatinine.

This study underscores the importance of regular monitoring of hematological and renal parameters in RA patients. Early detection and management of anemia, thrombocytosis, and renal dysfunction are crucial for improving patient outcomes and quality of life.

## REFERENCES

1. Koseki, Y., Terai, C., Moriguchi, M., Uesato, M., & Kamatani, N. (2001). A prospective study of renal disease in patients with early rheumatoid arthritis. *Annals of the rheumatic diseases*, *60*(4), 327-331.
2. Möller, B., Scherer, A., Förger, F., Villiger, P. M., Finckh, A., & Swiss Clinical Quality Management Program for Rheumatic Diseases. (2014). Anaemia may add information to standardised disease activity assessment to predict radiographic damage in rheumatoid arthritis: a prospective cohort study. *Annals of the rheumatic diseases*, *73*(4), 691-696.
3. Saurabh, S., Kumar, S., & Kumar, U. (2020). Evaluation of hematological parameters in rheumatoid arthritis and their correlation with disease activity. *J Family Med Prim Care*, *9*(4), 1893-1898.
4. Bleyer, A. J., Choi, M. J., & Igwemezie, B. (1996). Renal manifestations of rheumatoid arthritis. *Am J Kidney Dis*, *27*(3), 512-519.
5. Helmick, C. G., Felson, D. T., Lawrence, R. C., Gabriel, S., Hirsch, R., Kwoh, C. K., ... & National Arthritis Data Workgroup. (2008). Estimates of the prevalence of arthritis and other rheumatic conditions in the United States: Part I. *Arthritis & Rheumatism*, *58*(1), 15-25.
6. Karie, S., Gandjbakhch, F., Janus, N., Launay-Vacher, V., Rozenberg, S., Mai Ba, C. U., ... & Deray, G. (2008). Kidney disease in RA patients: prevalence and implication on RA-related drugs management: the MATRIX study. *Rheumatology*, *47*(3), 350-354.