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Influence of biological sex on hematological parameters in severe renal inflammation: A cross-sectional analysis

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Abstract
Background: Systemic hematological abnormalities reflecting inflammatory activity and renal involvement are often linked to severe renal inflammation. It's unknown how much biological sex affects these changes.
Aim: To compare results between male and female patients and assess hematological parameters in individuals with severe renal inflammation.
Methods: 140 individuals with severe renal inflammation 70 men and 70 women were included in this cross-sectional study. Using standard laboratory techniques, hematological parameters such as WBC, RBC, hemoglobin, hematocrit, and platelet count were measured. Appropriate statistical tests were used to compare groups, and $p<0.05$ was deemed statistically significant.
Results: Neither age nor any of the assessed hematological parameters showed statistically significant variations between male and female patients ($p>0.05$). Both groups showed similar hematological findings. In conclusion, hematological changes in severe renal inflammation seem to be independent of biological sex, indicating that changes in blood profiles are mostly determined by inflammatory mechanisms connected to the disease.

Keywords: Severe renal inflammation, hematological parameters, biological sex, inflammation, renal disease

Introduction
Renal failure represents a major clinical challenge worldwide due to its progressive nature and its profound impact on multiple physiological systems [1]. It is characterized by a substantial decline in renal function, resulting in impaired clearance of metabolic waste products, disturbances in fluid and electrolyte balance, and dysregulation of endocrine functions essential for homeostasis. Based on the rate of onset and disease course, renal failure is broadly categorized into acute kidney disease, which develops abruptly and may be reversible, and chronic kidney disease, which evolves gradually and is typically irreversible [2, 3]. Clinically, patients with renal failure may experience a wide spectrum of symptoms ranging from gastrointestinal disturbances, fatigue, and peripheral edema to neurological manifestations and cardiovascular complications. As renal dysfunction advances, systemic complications such as uremia, electrolyte imbalances, hypertension, and anemia frequently emerge, contributing to increased morbidity and reduced quality of life. The underlying causes of acute renal impairment often include hemodynamic instability, obstructive uropathies, drug toxicity, and immune-mediated disorders, whereas chronic renal failure is most commonly associated with long-standing metabolic and vascular conditions, including diabetes mellitus and hypertension [4, 5]. In addition to its direct renal effects, renal failure is closely linked to systemic inflammatory activation and metabolic derangements that can significantly influence hematological homeostasis. Persistent inflammation and reduced renal synthesis of erythropoietin play a pivotal role in the development of anemia, while alterations in leukocyte and platelet counts may reflect ongoing inflammatory responses and immune dysregulation. These hematological changes are not merely laboratory findings but are clinically relevant indicators of disease severity and progression [6]. Although hematological abnormalities are well recognized in patients with renal failure, the extent to which biological sex influences these parameters in the setting of severe renal inflammation remains insufficiently explored [7].

Clarifying whether sex-related differences exist is important for accurate interpretation of laboratory findings and optimal clinical assessment. Therefore, the present study aimed to evaluate and compare key hematological parameters between male and female patients with severe renal inflammation [8, 9].

Methods

Ethical Consideration: It was approved by the Institutional Ethics Committees of the Islamic University of Najaf College of Medical Technology Medical Laboratory Techniques Department and the Scientific Committee for Research in the Health Department of Najaf

Study Design and Participants

140 patients with a diagnosis of severe renal inflammation participated in a cross-sectional comparative study. There were 70 male and 70 female patients in the study population. During the study period, all participants were chosen from clinical units and laboratory services. Clinical assessment and test results consistent with severe renal inflammatory disease were used to make the diagnosis.

Inclusion and Exclusion Criteria

Patients of both sexes with confirmed severe renal inflammation were included in the study. Individuals with known hematological disorders, malignancies, chronic liver disease, or conditions that could independently affect hematological parameters were excluded to minimize confounding effects.

Sample Collection and Laboratory Analysis

Venous blood samples were collected under aseptic conditions. Hematological parameters, including white blood cell (WBC) count, red blood cell (RBC) count, hemoglobin (Hb), hematocrit (HCT), and platelet (PLT) count, were analyzed using standard automated hematology analyzers following routine laboratory protocols.

Statistical analysis

The results were expressed as mean and standard deviation (M ±SD). Statistical analyses were done by using paired t-test & ANOVA, independent students. Statistical analyses were done by using computer program SPSS version 10 with significant difference was set at $P< 0.05$ [10].

Results

No statistically significant differences were observed between male and female patients regarding age or hematological parameters, including WBC, RBC, hemoglobin, hematocrit, and platelet count ($p>0.05$).

Table 1: Comparison of Hematological Parameters between Male and Female Patients with Severe Renal Inflammation

Parameters	Mean ±SD.		P value	Significant
	Male	Female	(*P*<0.05)	
Age - Years	55.33±2.962	57.12±1.783	0.8587	No
WBC- ×10⁹/L	16.72±0.9115	17.63±2.042	0.8462	No
RBC- ×10¹²/L	5.091± 0.3407	4.751±2.015	0.9392	No
HGB- g/dL	9.94±0.6090	9.33±0.5070	0.3173	No
HCT- L/L%	31.5±2.978	28.52±1.966	0.1325	No
PTL- ×10⁹/L	187.7±13.24	174.5±18.94	0.4859	No

WBC: White Blood Cells, RBC: Red Blood Cells, HGB: Hemoglobin, HCT: Hematocrit, PLT: Platelets

Discussion

This study evaluated hematological parameters in male and female patients with glomerulonephritis in Najaf Governorate, Iraq, and found no statistically significant differences between the two groups at a p-value of less than 0.5. This finding suggests that biological sex does not appear to be an independent factor in determining hematological changes in patients with advanced glomerulonephritis [11]. The hematological abnormalities observed in glomerulonephritis are usually attributed to systemic inflammatory responses, impaired renal function, and disease-related metabolic disturbances. Sometimes, genetic factors are involved. Elevated inflammatory mediators can affect bone marrow activity and red blood cell production, leading to anemia and changes in white blood cell, red blood cell, and platelet counts. In such cases, the severity of inflammation may outweigh the normal physiological differences typically observed between males and females [12, 13]. The lack of statistically significant sex differences in hemoglobin and red blood cell indices can be explained by the inhibition of erythropoietin activity induced by inflammation and the reduced red blood cell survival rate, factors that affect both sexes similarly. Likewise, the similar white blood cell and platelet counts between male and female patients suggest a shared inflammatory response, rather than sex-specific hematological regulation [14, 15]. These findings are consistent with previous reports indicating that hematological changes in inflammatory kidney diseases are primarily due to disease severity and systemic inflammation, rather than biological sex. These findings highlight the importance of focusing on inflammation control and kidney function management, rather than sex-based stratification, when assessing hematological abnormalities in patients with acute nephritis [16, 17]. The cross-sectional design of this study and its dependence on standard blood measures without evaluating inflammatory biomarkers or disease duration are some of its shortcomings, though. The mechanisms driving hematological changes in inflammatory kidney illnesses may be better understood in the future with bigger sample sizes, longitudinal follow-up, and new renal and inflammatory markers. In summary, the current research indicates that hematological alterations linked to glomerulonephritis are similar in male and female patients, highlighting the predominance of inflammatory processes associated with the disease over physiological variations related to sex.

Conclusions

The findings show that among patients with severe renal inflammation, sex had no discernible impact on age or haematological markers. The observed haematological alterations seem to be gender-neutral, suggesting that both

male and female patients have similar inflammatory and haematological responses.

References

1. Muhammad-Baqir BM, Fattah AA, Al-Janabi DRA, Aljanaby AAJ. The prevalence study of patients infected with pyelonephritis in Al-Najaf Governorate, Iraq. In: BIO Web of Conferences. Les Ulis (France): EDP Sciences; 2023. p. 5049.
2. Borg R, Carlson N, Søndergaard J, Persson F. The growing challenge of chronic kidney disease: an overview of current knowledge. International Journal of Nephrology. 2023;2023:9609266.
3. Slee AD. Exploring metabolic dysfunction in chronic kidney disease. Nutrition & Metabolism (London). 2012;9(1):36.
4. Ortiz A, Covic A, Fliser D, Fouque D, Goldsmith D, Kanbay M, *et al*. Epidemiology, contributors to, and clinical trials of mortality risk in chronic kidney failure. The Lancet. 2014;383(9931):1831-1843.
5. Rossi M, Johnson DW, Morrison M, Pascoe EM, Coombes JS, Forbes JM, *et al*. Synbiotics easing renal failure by improving gut microbiology (SYNERGY): a randomized trial. Clinical Journal of the American Society of Nephrology. 2016;11(2):223-231.
6. Liu X, Zhang R, He G. Hematological findings in coronavirus disease 2019: indications of progression of disease. Annals of Hematology. 2020;99(7):1421-1428.
7. Al-Janabi DRA, Fattah AA, Aljanaby AAJ, Alhissnawy WH. Comparison of some blood parameters and vitamin D3 for patients with pyelonephritis and renal failure in Najaf Governorate, Iraq. Renal Failure. Year not clearly stated; volume and pages unclear in source.
8. Habib A, Ahmad R, Rehman S. Hematological changes in patients of chronic renal failure and the effect of hemodialysis on these parameters. International Journal of Research in Medical Sciences. 2017;5(11):4998-5003.
9. Hassan SS, Humaish HH. Study of hematological parameters in patients with renal failure. Wasit Journal for Pure Sciences. 2021;1:202-212.
10. Mansor DRAA. The relationship of interleukin-4, interleukin-10, and interferon-gamma levels with infection by COVID-19 in Karbala city, Iraq. Unpublished/Institutional report (PDF).
11. Al-Janabi DRA, Aljanaby AAJ. The role of monocyte chemotactic protein-3 (MCP-3) in pyelonephritis patients in Al-Najaf Governorate, Iraq. Cardiometry. 2024;(31):105-109.
12. Sethi S, De Vriese AS, Fervenza FC. Acute glomerulonephritis. The Lancet. 2022;399(10335):1646-1663.
13. Wacka E, Wawrzyniak-Gramacka E, Tylutka A, Morawin B, Gutowicz M, Zembron-Lacny A. The role of inflammation in age-associated changes in red blood system. International Journal of Molecular Sciences. 2023;24(10):8944.
14. Bruserud Ø, Vo AK, Rekvam H. Hematopoiesis, inflammation and aging The biological background and clinical impact of anemia and increased C-reactive protein levels on elderly individuals. Journal of Clinical Medicine. 2022;11(3):706.
15. Tariq S, Ismail D, Thapa M, Goriparthi L, Pradeep R, Khalid K, *et al*. Chronic obstructive pulmonary disease and its effect on red blood cell indices. Cureus. 2023;15(3).
16. Soranno DE, Awdishu L, Bagshaw SM, Basile D, Bell S, Bihorac A, *et al*. The role of sex and gender in acute kidney injury consensus statements from the 33rd Acute Disease Quality Initiative. Kidney International. 2025;107(4):606-616.
17. Akcan Arikan A, Ostermann M, Goldstein SL, Kellum JA. Sepsis criteria and kidney function: eliminating sex, age and economic status biases. Nature Reviews Nephrology. 2025:1-11.

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