Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review

Article · May 2024

CITATIONS
4

READS
16

2 authors:

Emmanuel Ifeanyi Obeagu
Kampala International University (KIU)
1,630 PUBLICATIONS **21,998** CITATIONS
SEE PROFILE

Sharon Seni Itoe Ngomo
University of Buea
4 PUBLICATIONS **4** CITATIONS
SEE PROFILE

Elite Journal of Haematology. Volume 2 issue 5(2024), Pp. 72-89
https://epjournals.com/journals/EJH

Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review

[*]Emmanuel Ifeanyi Obeagu[1] and Sharon Seni Itoe Ngomo[2]

[1]Department of Medical Laboratory Science, Kampala International University, Uganda

[2]Department of Microbiology and Parasitology, University of Buea, Buea, Cameroon

[*]Corresponding authour: Emmanuel Ifeanyi Obeagu, Department of Medical Laboratory Science, Kampala International University, Uganda, emmanuelobeagu@yahoo.com, ORCID: 0000-0002-4538-0161

Abstract

Hemophilia, a rare bleeding disorder, frequently coexists with HIV infection due to shared risk factors such as blood product transfusions. Erythrocyte morphology alterations in hemophilia patients co-infected with HIV have garnered recent attention due to potential implications for disease management and prognosis. Erythrocytes, or red blood cells (RBCs), play a crucial role in oxygen transport and tissue perfusion. In hemophilia, deficient or defective clotting factors can lead to spontaneous or prolonged bleeding episodes, contributing to anemia and subsequent changes in erythrocyte morphology. Moreover, the presence of HIV infection introduces additional complexities to the erythrocyte morphology profile, with HIV-associated hematological abnormalities exacerbating pre-existing erythrocyte abnormalities in hemophilia patients. The pathophysiological mechanisms driving erythrocyte morphology alterations in hemophilia patients co-infected with HIV are multifactorial. Chronic inflammation, immune dysregulation, and bone marrow suppression associated with HIV infection disrupt erythropoiesis and promote the development of morphological abnormalities in RBCs. Clinical implications of erythrocyte morphology alterations include the need for monitoring erythrocyte parameters and optimizing ART regimens and supportive measures to mitigate the impact on patient outcomes. Continued research efforts are warranted to elucidate the underlying mechanisms and guide therapeutic strategies in hemophilia patients with HIV co-infection.

Keywords: *Hemophilia, HIV, co-infection, erythrocyte morphology, red blood cells, anemia, thrombocytopenia, pathophysiology, clinical implications, management*

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

Introduction

Hemophilia, a hereditary bleeding disorder characterized by deficient or defective clotting factors, poses significant challenges to affected individuals due to the risk of spontaneous or prolonged bleeding episodes. This condition, often diagnosed in childhood, requires lifelong management to prevent and treat bleeding complications effectively. In parallel, the advent of highly effective antiretroviral therapy (ART) has transformed the landscape of HIV infection, leading to improved life expectancy and quality of life for individuals living with the virus. However, the coexistence of hemophilia and HIV infection presents a unique set of challenges, necessitating a comprehensive understanding of their interplay to optimize patient care and outcomes. The intersection of hemophilia and HIV infection is not uncommon, particularly in populations where both conditions share common risk factors, such as exposure to contaminated blood products before the implementation of universal screening protocols. Historically, the hemophilia community experienced devastating consequences during the early years of the HIV/AIDS epidemic, with a high prevalence of HIV infection among individuals receiving clotting factor concentrates. While the implementation of safety measures has significantly reduced the risk of HIV transmission through blood products, co-infection remains a pertinent issue, particularly in regions with limited access to safe clotting factor concentrates and comprehensive HIV care.[1-20]

Erythrocytes, or red blood cells (RBCs), play a fundamental role in oxygen transport and tissue perfusion, making their morphology a critical aspect of overall health and well-being. In individuals with hemophilia, the underlying bleeding tendency can lead to anemia, characterized by a reduction in RBC count and hemoglobin levels. Additionally, alterations in erythrocyte morphology, such as changes in cell size, shape, and hemoglobin content, may occur secondary to chronic anemia or other hematological disturbances associated with hemophilia. The presence of HIV infection introduces additional complexities to the erythrocyte morphology profile in hemophilia patients. HIV-associated hematological abnormalities, including anemia and thrombocytopenia, can exacerbate pre-existing erythrocyte abnormalities in hemophilia and contribute to a distinct morphological phenotype. Moreover, the direct effects of HIV on bone marrow function and erythropoiesis may further influence erythrocyte morphology, potentially altering cell size, shape, and hemoglobin content. Understanding the mechanisms underlying erythrocyte morphology alterations in hemophilia patients co-infected with HIV is crucial for elucidating disease pathogenesis and guiding therapeutic strategies to mitigate hematological complications in this population.[21-39]

This review aims to synthesize current knowledge on erythrocyte morphology in hemophilia patients co-infected with HIV, exploring underlying mechanisms, clinical significance, and implications for patient care.

Erythrocyte Morphology in Hemophilia

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

Erythrocyte morphology in hemophilia represents a significant aspect of hematological manifestations in individuals with this bleeding disorder.[40] Hemophilia, characterized by deficient or defective clotting factors, predisposes affected individuals to spontaneous or prolonged bleeding episodes, which can have implications for erythrocyte parameters. Anemia, a common consequence of chronic bleeding, is often observed in individuals with hemophilia and can lead to alterations in erythrocyte morphology. Anemia in hemophilia patients may manifest as a reduction in red blood cell (RBC) count, hemoglobin levels, and hematocrit. These hematological changes reflect the loss of blood volume during bleeding episodes and the body's compensatory mechanisms to maintain tissue oxygenation. Consequently, alterations in erythrocyte morphology, such as changes in cell size (mean corpuscular volume, MCV), hemoglobin content (mean corpuscular hemoglobin, MCH), and cell distribution width (RDW), may occur as a consequence of chronic anemia in hemophilia.[41-42]

Microcytosis, characterized by smaller than normal RBC size, and hypochromia, indicative of decreased hemoglobin content within RBCs, are commonly observed in individuals with hemophilia-associated anemia. These erythrocyte abnormalities reflect impaired erythropoiesis and inadequate hemoglobin synthesis due to chronic bleeding and iron deficiency.[42] Additionally, the presence of poikilocytosis, or abnormal RBC shape, may occur secondary to the mechanical stress exerted on RBCs during bleeding episodes or as a result of underlying hematological disorders. The management of erythrocyte morphology alterations in hemophilia patients involves addressing the underlying cause of anemia, primarily by preventing and treating bleeding episodes effectively. This includes the administration of clotting factor replacement therapy to control bleeding and minimize blood loss, as well as the correction of iron deficiency through oral or parenteral iron supplementation. Regular monitoring of erythrocyte parameters, including MCV, MCH, and RDW, can aid in assessing disease severity, monitoring treatment response, and guiding therapeutic interventions to optimize hematological outcomes in individuals with hemophilia.

Impact of HIV Co-infection on Erythrocyte Morphology

The impact of HIV co-infection on erythrocyte morphology in individuals with hemophilia represents a complex interplay between the hematological consequences of both conditions. HIV infection is associated with a spectrum of hematological abnormalities, including anemia, thrombocytopenia, and bone marrow suppression, which can contribute to alterations in erythrocyte parameters. In individuals co-infected with HIV and hemophilia, these hematological disturbances may exacerbate pre-existing erythrocyte morphology abnormalities and lead to a distinct morphological phenotype. Anemia is a common complication of HIV infection, resulting from various etiologies such as chronic inflammation, opportunistic infections, and medication side effects. HIV-induced anemia is characterized by decreased red blood cell production, shortened red blood cell lifespan, and impaired erythropoietin response, leading to alterations in erythrocyte morphology. Microcytosis, hypochromia, and anisocytosis are commonly observed in

individuals with HIV-associated anemia, reflecting impaired erythropoiesis and inadequate hemoglobin synthesis.[43-57]

Thrombocytopenia, another hematological manifestation of HIV infection, can further impact erythrocyte morphology through its effects on clotting factor function and platelet-mediated hemostasis. Reduced platelet counts may exacerbate bleeding tendencies in individuals with hemophilia, leading to increased erythrocyte destruction and subsequent alterations in erythrocyte parameters. Additionally, bone marrow suppression induced by HIV infection can impair erythropoiesis and contribute to erythrocyte morphology abnormalities, including changes in cell size, shape, and hemoglobin content. The direct effects of HIV on bone marrow function and erythropoiesis may also play a role in erythrocyte morphology alterations in individuals co-infected with HIV and hemophilia. HIV infects and replicates within hematopoietic progenitor cells, leading to impaired erythropoietin production, dysregulated erythropoiesis, and decreased red blood cell lifespan. These pathophysiological changes can result in a unique erythrocyte morphology profile characterized by a combination of microcytosis, hypochromia, and poikilocytosis in individuals with HIV and hemophilia co-infection.[58-77]

Mechanisms Underlying Erythrocyte Morphology Alterations

The mechanisms underlying erythrocyte morphology alterations in individuals with hemophilia and HIV co-infection involve a complex interplay of hematological disturbances, immune dysregulation, and bone marrow dysfunction. Chronic inflammation, a hallmark of HIV infection, contributes to erythrocyte morphology abnormalities through various pathways, including cytokine-mediated suppression of erythropoiesis, dysregulated iron metabolism, and impaired red blood cell maturation. In individuals with hemophilia, the underlying bleeding tendency leads to chronic anemia, characterized by reduced red blood cell production and hemoglobin synthesis. Prolonged bleeding episodes result in the loss of iron and other essential nutrients necessary for erythropoiesis, leading to iron deficiency anemia and subsequent alterations in erythrocyte morphology, such as microcytosis and hypochromia. Additionally, repeated exposure to clotting factor replacement therapy may exacerbate iron overload and further contribute to erythrocyte morphology abnormalities. HIV infection exacerbates erythrocyte morphology alterations through its effects on bone marrow function and erythropoiesis. HIV infects and replicates within hematopoietic progenitor cells, leading to direct viral-mediated damage, impaired erythropoietin production, and dysregulated erythropoiesis. The resulting bone marrow suppression and ineffective erythropoiesis contribute to erythrocyte morphology abnormalities, including microcytosis, hypochromia, and poikilocytosis. Furthermore, immune dysregulation associated with HIV infection plays a role in erythrocyte morphology alterations through the production of pro-inflammatory cytokines, such as tumor necrosis factor-alpha (TNF-α) and interleukin-6 (IL-6). These cytokines suppress erythropoiesis, disrupt iron metabolism, and induce oxidative stress, leading to erythrocyte membrane damage and subsequent changes in erythrocyte morphology. Additionally, chronic immune activation and inflammation contribute to accelerated erythrocyte

turnover and increased red blood cell destruction, further exacerbating erythrocyte morphology abnormalities.[78-98]

Clinical Implications and Management Considerations

The clinical implications of erythrocyte morphology alterations in individuals with hemophilia and HIV co-infection are multifaceted and have significant implications for disease management and patient care. Monitoring erythrocyte parameters, including mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC), and red cell distribution width (RDW), can serve as valuable diagnostic and monitoring tools in individuals with hemophilia and HIV co-infection. Regular assessment of erythrocyte morphology can help identify hematological complications, track disease progression, and guide therapeutic interventions. Anemia is a common complication in individuals with hemophilia and HIV co-infection, and its management is essential for optimizing patient outcomes. Treatment strategies may include addressing underlying causes of anemia, such as bleeding episodes and iron deficiency, through the administration of clotting factor replacement therapy, iron supplementation, and erythropoietin-stimulating agents. Close monitoring of hemoglobin levels and erythrocyte parameters is necessary to guide treatment decisions and ensure adequate management of anemia.[99-130]

The selection and optimization of ART regimens are crucial considerations in the management of individuals with HIV co-infection. Certain antiretroviral medications may have hematological side effects, such as bone marrow suppression and anemia, which can exacerbate erythrocyte morphology abnormalities. Healthcare providers should carefully monitor hematological parameters and adjust ART regimens as needed to minimize adverse effects on erythrocyte morphology. Supportive measures, such as nutritional support and blood transfusions, may be necessary to address severe anemia and erythrocyte morphology abnormalities in individuals with hemophilia and HIV co-infection. Nutritional interventions, including dietary counseling and supplementation with vitamins and minerals, can help optimize erythropoiesis and improve erythrocyte morphology. In cases of severe anemia or acute blood loss, blood transfusions may be required to restore red blood cell mass and improve tissue oxygenation. Long-term monitoring and follow-up are essential components of the management of individuals with hemophilia and HIV co-infection. Regular assessment of erythrocyte parameters, along with comprehensive hematological evaluations, can help identify changes in disease status, monitor treatment response, and detect potential complications. Healthcare providers should establish individualized care plans and provide ongoing support to address the complex needs of this population.[131-163]

Conclusion

Erythrocyte morphology alterations represent a significant aspect of hematological manifestations in individuals with hemophilia and HIV co-infection. The complex interplay of underlying bleeding tendencies, HIV-induced hematological disturbances, and immune dysregulation

contributes to a unique erythrocyte morphology profile in this population. The clinical implications of erythrocyte morphology alterations in individuals with hemophilia and HIV co-infection encompass various aspects of diagnostic assessment, treatment strategies, and long-term monitoring. By utilizing diagnostic tools to assess erythrocyte parameters and monitoring hematological status, healthcare providers can identify and address hematological complications promptly. Management considerations, including anemia management, optimization of antiretroviral therapy, and supportive measures, are essential components of comprehensive care for affected individuals.

References

1. Menegatti M, Peyvandi F. Treatment of rare factor deficiencies other than hemophilia. Blood, The Journal of the American Society of Hematology. 2019;133(5):415-524.
2. Patton LL. Bleeding and clotting disorders. Burket's oral medicine: diagnosis and treatment. 10th ed. Hamilton (ON): BC Decker. 2003:454-477.
3. Livanou ME, Matsas A, Valsami S, Papadimitriou DT, Kontogiannis A, Christopoulos P. Clotting Factor Deficiencies as an Underlying Cause of Abnormal Uterine Bleeding in Women of Reproductive Age: A Literature Review. Life. 2023;13(6):1321.
4. Bauer KA. Current challenges in the management of hemophilia. Am J Manag Care. 2015;21(6 Suppl):S112-22.
5. Berntorp E, Fischer K, Hart DP, Mancuso ME, Stephensen D, Shapiro AD, Blanchette V. Haemophilia. Nature reviews Disease primers. 2021 Jun 24;7(1):45.
6. Karim MA, Jamal CY. A review on hemophilia in children. Bangladesh J Child Health. 2013;37(1):27-40.
7. Obeagu EI. Haemophilia B: A Review. Int. J. Curr. Res. Chem. Pharm. Sci. 2022;9(1):14-20.
8. Okoroiwu IL, Obeagu EI, Egbuobi LN, Ibekwe AM, Vincent CC, Unaeze BC, Adike CN, Chijioke UO, Okafor CJ, Soremi AO, Chukwurah EF. Evaluation of Factor Viii and Factor IX Activity among Primary School Children in Owerri, Imo State, Nigeria. Journal of Pharmaceutical Research International. 2021 Jul 3;33(34B):235-41.
9. Obeagu EI, Obeagu GU, Musiimenta E. Post partum haemorrhage among pregnant women: Update on risks factors. Int. J. Curr. Res. Med. Sci. 2023;9(2):14-7.
10. Obeagu EI, Eze RI, Nwakulite A, Obeagu GU, Babar Q. AN UPDATE ON HAEMOPHILIA A. A. Journal of Medicine and Health Sciences. 2021;1(1):7-18.
11. Obeagu EI, Obeagu GU. Postpartum haemorrhage among women delivering through spontaneous vaginal delivery: Prevalence and risk factors. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(8):22-6.
12. Ifeanyi OE, Obeagu GU. The values of prothrombin time among HIV positive patients in FMC owerri. International Journal of Current Microbiology and Applied Sciences. 2015;4(4):911-6.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

13. Ifeanyi OE, Obeagu GU, Ijeoma FO, Chioma UI. The values of activated partial thromboplastin time (APTT) among HIV positive patients in FMC Owerri. Int J Curr Res Aca Rev. 2015;3:139-44.
14. Obeagu EI, Obeagu GU, Kama SC. Fibrin degradation product and Haemorrhage. Int. J. Curr. Res. Chem. Pharm. Sci. 2022;9(1):21-7.
15. Obeagu E, Nwosu D, Obeagu III G. Antithrombin III: A Review. Int. J. Curr. Res. Biol. Med. 2022;7(2):20-7.
16. Obeagu EI, Okwuanaso CB, Edoho SH, Obeagu GU. Under-nutrition among HIV-exposed Uninfected Children: A Review of African Perspective. Madonna University journal of Medicine and Health Sciences. 2022;2(3):120-127.
17. Obeagu EI. A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. Madonna University journal of Medicine and Health Sciences. 2023 ;3(1):7-12. https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/91.
18. Obeagu EI, Obeagu GU. An update on premalignant cervical lesions and cervical cancer screening services among HIV positive women. J Pub Health Nutri. 2023; 6 (2). 2023; 141:1-2. links/63e538ed64252375639dd0df/An-update-on-premalignant-cervical-lesions-and-cervical-cancer-screening-services-among-HIV-positive-women.pdf.
19. Ezeoru VC, Enweani IB, Ochiabuto O, Nwachukwu AC, Ogbonna US, Obeagu EI. Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. Journal of Pharmaceutical Research International. 2021;33(4):10-19.
20. Omo-Emmanuel UK, Chinedum OK, Obeagu EI. Evaluation of laboratory logistics management information system in HIV/AIDS comprehensive health facilities in Bayelsa State, Nigeria. Int J Curr Res Med Sci. 2017;3(1): 21-38.DOI: 10.22192/ijcrms.2017.03.01.004
21. McCann SR. A History of haematology: from Herodotus to HIV. Oxford University Press; 2016.
22. McCann SR. A History of haematology: from Herodotus to HIV. Oxford University Press; 2016.
23. Provan D. Oxford handbook of clinical haematology. Oxford University Press, USA; 2009.
24. Doering CB, Archer D, Spencer HT. Delivery of nucleic acid therapeutics by genetically engineered hematopoietic stem cells. Advanced drug delivery reviews. 2010;62(12):1204-1212.
25. Obeagu EI, Obeagu GU. An update on survival of people living with HIV in Nigeria. J Pub Health Nutri. 2022; 5 (6). 2022;129. links/645b4bfcf3512f1cc5885784/An-update-on-survival-of-people-living-with-HIV-in-Nigeria.pdf.
26. Offie DC, Obeagu EI, Akueshi C, Njab JE, Ekanem EE, Dike PN, Oguh DN. Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. Journal of Pharmaceutical Research International. 2021;33(52B):10-19.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

27. Obeagu EI, Ogbonna US, Nwachukwu AC, Ochiabuto O, Enweani IB, Ezeoru VC. Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. Journal of Pharmaceutical Research International. 2021;33(4):10-19.
28. Odo M, Ochei KC, Obeagu EI, Barinaadaa A, Eteng UE, Ikpeme M, Bassey JO, Paul AO. TB Infection Control in TB/HIV Settings in Cross River State, Nigeria: Policy Vs Practice. Journal of Pharmaceutical Research International. 2020;32(22):101-119.
29. Obeagu EI, Eze VU, Alaeboh EA, Ochei KC. Determination of haematocrit level and iron profile study among persons living with HIV in Umuahia, Abia State, Nigeria. J BioInnovation. 2016; 5:464-471. links/592bb4990f7e9b9979a975cf/DETERMINATION-OF-HAEMATOCRIT-LEVEL-AND-IRON-PROFILE-STUDY-AMONG-PERSONS-LIVING-WITH-HIV-IN-UMUAHIA-ABIA-STATE-NIGERIA.pdf.
30. Ifeanyi OE, Obeagu GU. The values of prothrombin time among HIV positive patients in FMC owerri. International Journal of Current Microbiology and Applied Sciences. 2015;4(4):911-916. https://www.academia.edu/download/38320140/Obeagu_Emmanuel_Ifeanyi_and_Obeagu__Getrude_Uzoma2.EMMA1.pdf.
31. Izuchukwu IF, Ozims SJ, Agu GC, Obeagu EI, Onu I, Amah H, Nwosu DC, Nwanjo HU, Edward A, Arunsi MO. Knowledge of preventive measures and management of HIV/AIDS victims among parents in Umuna Orlu community of Imo state Nigeria. Int. J. Adv. Res. Biol. Sci. 2016;3(10): 55-65.DOI; 10.22192/ijarbs.2016.03.10.009
32. Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, Ojong OE, Odunze U. HIV and TB co-infection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. IOSR J Pharm Biol Sci. 2017;12(4):70-75. links/5988ab6d0f7e9b6c8539f73d/HIV-and-TB-co-infection-among-patients-who-used-Directly-Observed-Treatment-Short-course-centres-in-Yenagoa-Nigeria.pdf
33. Oloro OH, Oke TO, Obeagu EI. Evaluation of Coagulation Profile Patients with Pulmonary Tuberculosis and Human Immunodeficiency Virus in Owo, Ondo State, Nigeria. Madonna University journal of Medicine and Health Sciences. 2022;2(3):110-119.
34. Nwosu DC, Obeagu EI, Nkwocha BC, Nwanna CA, Nwanjo HU, Amadike JN, Elendu HN, Ofoedeme CN, Ozims SJ, Nwankpa P. Change in Lipid Peroxidation Marker (MDA) and Non enzymatic Antioxidants (VIT C & E) in HIV Seropositive Children in an Urban Community of Abia State. Nigeria. J. Bio. Innov. 2016;5(1):24-30. links/5ae735e9a6fdcc5b33eb8d6a/CHANGE-IN-LIPID-PEROXIDATION-MARKER-MDAAND-NON-ENZYMATIC-ANTIOXIDANTS-VIT-C-E-IN-HIV-SEROPOSITIVE-CHILDREN-IN-AN-URBAN-COMMUNITY-OF-ABIA-STATE-NIGERIA.pdf.
35. Ifeanyi OE, Obeagu GU, Ijeoma FO, Chioma UI. The values of activated partial thromboplastin time (APTT) among HIV positive patients in FMC Owerri. Int J Curr Res Aca Rev. 2015; 3:139-144. https://www.academia.edu/download/38320159/Obeagu_Emmanuel_Ifeanyi3__et_al.IJCRAR.pdf.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

36. Obiomah CF, Obeagu EI, Ochei KC, Swem CA, Amachukwu BO. Hematological indices o HIV seropositive subjects in Nnamdi Azikiwe University teaching hospital (NAUTH), Nnewi. Ann Clin Lab Res. 2018;6(1):1-4. links/5aa2bb17a6fdccd544b7526e/Haematological-Indices-of-HIV-Seropositive-Subjects-at-Nnamdi-Azikiwe.pdf
37. Omo-Emmanuel UK, Ochei KC, Osuala EO, Obeagu EI, Onwuasoanya UF. Impact of prevention of mother to child transmission (PMTCT) of HIV on positivity rate in Kafanchan, Nigeria. Int. J. Curr. Res. Med. Sci. 2017;3(2): 28-34.DOI: 10.22192/ijcrms.2017.03.02.005
38. Aizaz M, Abbas FA, Abbas A, Tabassum S, Obeagu EI. Alarming rise in HIV cases in Pakistan: Challenges and future recommendations at hand. Health Science Reports. 2023;6(8):e1450.
39. Obeagu EI, Amekpor F, Scott GY. An update of human immunodeficiency virus infection: Bleeding disorders. J Pub Health Nutri. 2023; 6 (1). 2023;139. links/645b4a6c2edb8e5f094d9bd9/An-update-of-human-immunodeficiency-virus-infection-Bleeding.pdf.
40. Adeyemo TA, Adeyemo WL, Adediran A, Abd Jaleel AA, Akanmu AS. Orofacial manifestations of hematological disorders: Anemia and hemostatic disorders. Indian Journal of Dental Research. 2011;22(3):454-461.
41. Jayandharan GR, Srivastava A. The phenotypic heterogeneity of severe hemophilia. In Seminars in thrombosis and hemostasis 2008; 01: 128-141.
42. Brugnara C. Iron deficiency and erythropoiesis: new diagnostic approaches. Clinical chemistry. 2003;49(10):1573-1578.
43. Obeagu EI, Scott GY, Amekpor F, Ofodile AC, Edoho SH, Ahamefula C. Prevention of New Cases of Human Immunodeficiency Virus: Pragmatic Approaches of Saving Life in Developing Countries. Madonna University journal of Medicine and Health Sciences. 2022;2(3):128-134. https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/86.
44. Walter O, Anaebo QB, Obeagu EI, Okoroiwu IL. Evaluation of Activated Partial Thromboplastin Time and Prothrombin Time in HIV and TB Patients in Owerri Metropolis. Journal of Pharmaceutical Research International. 2022:29-34.
45. Odo M, Ochei KC, Obeagu EI, Barinaadaa A, Eteng EU, Ikpeme M, Bassey JO, Paul AO. Cascade variabilities in TB case finding among people living with HIV and the use of IPT: assessment in three levels of care in cross River State, Nigeria. Journal of Pharmaceutical Research International. 2020;32(24):9-18.
46. Jakheng SP, Obeagu EI. Seroprevalence of human immunodeficiency virus based on demographic and risk factors among pregnant women attending clinics in Zaria Metropolis, Nigeria. J Pub Health Nutri. 2022; 5 (8). 2022;137. links/6317a6b1acd814437f0ad268/Seroprevalence-of-human-immunodeficiency-virus-based-on-demographic-and-risk-factors-among-pregnant-women-attending-clinics-in-Zaria-Metropolis-Nigeria.pdf.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

47. Obeagu EI, Obeagu GU. A Review of knowledge, attitudes and socio-demographic factors associated with non-adherence to antiretroviral therapy among people living with HIV/AIDS. Int. J. Adv. Res. Biol. Sci. 2023;10(9):135-142.DOI: 10.22192/ijarbs.2023.10.09.015 links/6516faa61e2386049de5e828/A-Review-of-knowledge-attitudes-and-socio-demographic-factors-associated-with-non-adherence-to-antiretroviral-therapy-among-people-living-with-HIV-AIDS.pdf
48. Obeagu EI, Onuoha EC. Tuberculosis among HIV Patients: A review of Prevalence and Associated Factors. Int. J. Adv. Res. Biol. Sci. 2023;10(9):128-134.DOI: 10.22192/ijarbs.2023.10.09.014 links/6516f938b0df2f20a2f8b0e0/Tuberculosis-among-HIV-Patients-A-review-of-Prevalence-and-Associated-Factors.pdf.
49. Obeagu EI, Ibeh NC, Nwobodo HA, Ochei KC, Iwegbulam CP. Haematological indices of malaria patients coinfected with HIV in Umuahia. Int. J. Curr. Res. Med. Sci. 2017;3(5):100-104.DOI: 10.22192/ijcrms.2017.03.05.014 https://www.academia.edu/download/54317126/Haematological_indices_of_malaria_patients_coinfected_with_HIV.pdf
50. Jakheng SP, Obeagu EI, Abdullahi IO, Jakheng EW, Chukwueze CM, Eze GC, Essien UC, Madekwe CC, Madekwe CC, Vidya S, Kumar S. Distribution Rate of Chlamydial Infection According to Demographic Factors among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria. South Asian Journal of Research in Microbiology. 2022;13(2):26-31.
51. Okorie HM, Obeagu Emmanuel I, Okpoli Henry CH, Chukwu Stella N. Comparative study of enzyme linked immunosorbent assay (Elisa) and rapid test screening methods on HIV, Hbsag, Hcv and Syphilis among voluntary donors in. Owerri, Nigeria. J Clin Commun Med. 2020;2(3):180-183.DOI: **DOI:** 10.32474/JCCM.2020.02.000137 links/5f344530458515b7291bd95f/Comparative-Study-of-Enzyme-Linked-Immunosorbent-Assay-ElISA-and-Rapid-Test-Screening-Methods-on-HIV-HBsAg-HCV-and-Syphilis-among-Voluntary-Donors-in-Owerri-Nigeria.pdf.
52. Ezugwu UM, Onyenekwe CC, Ukibe NR, Ahaneku JE, Onah CE, Obeagu EI, Emeje PI, Awalu JC, Igbokwe GE. Use of ATP, GTP, ADP and AMP as an Index of Energy Utilization and Storage in HIV Infected Individuals at NAUTH, Nigeria: A Longitudinal, Prospective, Case-Controlled Study. Journal of Pharmaceutical Research International. 2021;33(47A):78-84.
53. Emannuel G, Martin O, Peter OS, Obeagu EI, Daniel K. Factors Influencing Early Neonatal Adverse Outcomes among Women with HIV with Post Dated Pregnancies Delivering at Kampala International University Teaching Hospital, Uganda. Asian Journal of Pregnancy and Childbirth. 2023 Jul 29;6(1):203-211. http://research.sdpublishers.net/id/eprint/2819/.
54. Vincent CC, Obeagu EI, Agu IS, Ukeagu NC, Onyekachi-Chigbu AC. Adherence to Antiretroviral Therapy among HIV/AIDS in Federal Medical Centre, Owerri. Journal of Pharmaceutical Research International. 2021;33(57A):360-368.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

55. Madekwe CC, Madekwe CC, Obeagu EI. Inequality of monitoring in Human Immunodeficiency Virus, Tuberculosis and Malaria: A Review. Madonna University journal of Medicine and Health Sciences. 2022;2(3):6-15. https://madonnauniversity.edu.ng/journals/index.php/medicine/article/view/69
56. Echendu GE, Vincent CC, Ibebuike J, Asodike M, Naze N, Chinedu EP, Ohale B, Obeagu EI. WEIGHTS OF INFANTS BORN TO HIV INFECTED MOTHERS: A PROSPECTIVE COHORT STUDY IN FEDERAL MEDICAL CENTRE, OWERRI, IMO STATE. European Journal of Pharmaceutical and Medical Research, 2023; 10(8): 564-568
57. Nwosu DC, Nwanjo HU, Okolie NJ, Ikeh K, Ajero CM, Dike J, Ojiegbe GC, Oze GO, Obeagu EI, Nnatunanya I, Azuonwu O. BIOCHEMICAL ALTERATIONS IN ADULT HIV PATIENTS ON ANTIRETRQVIRAL THERAPY. World Journal of Pharmacy and Pharmaceutical Sciences, 2015; 4(3): 153-160**.** links/5a4fd0500f7e9bbc10526b38/BIOCHEMICAL-ALTERATIONS-IN-ADULT-HIV-PATIENTS-ON-ANTIRETRQVIRAL-THERAPY.pdf.
58. Obeagu EI, Obeagu GU. Effect of CD4 Counts on Coagulation Parameters among HIV Positive Patients in Federal Medical Centre, Owerri, Nigeria. Int. J. Curr. Res. Biosci. Plant Biol. 2015;2(4):45-49.
59. Obeagu EI, Nwosu DC. Adverse drug reactions in HIV/AIDS patients on highly active antiretro viral therapy: a review of prevalence. Int. J. Curr. Res. Chem. Pharm. Sci. 2019;6(12):45-8.DOI: 10.22192/ijcrcps.2019.06.12.004 links/650aba1582f01628f0335795/Adverse-drug-reactions-in-HIV-AIDS-patients-on-highly-active-antiretro-viral-therapy-a-review-of-prevalence.pdf.
60. Obeagu EI, Scott GY, Amekpor F, Obeagu GU. Implications of CD4/CD8 ratios in Human Immunodeficiency Virus infections. Int. J. Curr. Res. Med. Sci. 2023;9(2):6-13.DOI: 10.22192/ijcrms.2023.09.02.002 links/645a4a462edb8e5f094ad37c/Implications-of-CD4-CD8-ratios-in-Human-Immunodeficiency-Virus-infections.pdf.
61. Obeagu EI, Ochei KC, Okeke EI, Anode AC. Assessment of the level of haemoglobin and erythropoietin in persons living with HIV in Umuahia. Int. J. Curr. Res. Med. Sci. 2016;2(4):29-33. links/5711c47508aeebe07c02496b/Assessment-of-the-level-of-haemoglobin-and-erythropoietin-in-persons-living-with-HIV-in-Umuahia.pdf.
62. Ifeanyi OE, Obeagu GU. The Values of CD4 Count, among HIV Positive Patients in FMC Owerri. Int. J. Curr. Microbiol. App. Sci. 2015;4(4):906-910. https://www.academia.edu/download/38320134/Obeagu_Emmanuel_Ifeanyi_and_Obeagu__Getrude_Uzoma.EMMA2.pdf.
63. Obeagu EI, Okeke EI, Anonde Andrew C. Evaluation of haemoglobin and iron profile study among persons living with HIV in Umuahia, Abia state, Nigeria. Int. J. Curr. Res. Biol. Med. 2016;1(2):1-5.
64. Ibebuike JE, Nwokike GI, Nwosu DC, Obeagu EI. A Retrospective Study on Human Immune Deficiency Virus among Pregnant Women Attending Antenatal Clinic in Imo State University Teaching Hospital. *International Journal of Medical Science and Dental Research,* 2018; 1 (2):08-14.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

https://www.ijmsdr.org/published%20paper/li1i2/A%20Retrospective%20Study%20on%20Human%20Immune%20Deficiency%20Virus%20among%20Pregnant%20Women%20Attending%20Antenatal%20Clinic%20in%20Imo%20State%20University%20Teaching%20Hospital.pdf.

65. Obeagu EI, Obarezi TN, Omeh YN, Okoro NK, Eze OB. Assessment of some haematological and biochemical parametrs in HIV patients before receiving treatment in Aba, Abia State, Nigeria. Res J Pharma Biol Chem Sci. 2014; 5:825-830.
66. Obeagu EI, Obarezi TN, Ogbuabor BN, Anaebo QB, Eze GC. Pattern of total white blood cell and differential count values in HIV positive patients receiving treatment in Federal Teaching Hospital Abakaliki, Ebonyi State, Nigeria. International Journal of Life Science, Biotechnology and Pharama Research. 2014; 391:186-189.
67. Obeagu EI. A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. Madonna University journal of Medicine and Health Sciences. 2023; 3 (1): 7-12.
68. Oloro OH, Obeagu EI. A Systematic Review on Some Coagulation Profile in HIV Infection. International Journal of Innovative and Applied Research. 2022;10(5):1-11.
69. Nwosu DC, Obeagu EI, Nkwuocha BC, Nwanna CA, Nwanjo HU, Amadike JN, Ezemma MC, Okpomeshine EA, Ozims SJ, Agu GC. Alterations in superoxide dismutiase, vitamins C and E in HIV infected children in Umuahia, Abia state. International Journal of Advanced Research in Biological Sciences. 2015;2(11):268-271.
70. Ifeanyi OE, Uzoma OG, Stella EI, Chinedum OK, Abum SC. Vitamin D and insulin resistance in HIV sero positive individuals in Umudike. Int. J. Curr. Res. Med. Sci. 2018;4(2):104-108.
71. Ifeanyi OE, Leticia OI, Nwosu D, Chinedum OK. A Review on blood borne viral infections: universal precautions. Int. J. Adv. Res. Biol. Sci. 2018;5(6):60-66.
72. Nwovu AI, Ifeanyi OE, Uzoma OG, Nwebonyi NS. Occurrence of Some Blood Borne Viral Infection and Adherence to Universal Precautions among Laboratory Staff in Federal Teaching Hospital Abakaliki Ebonyi State. Arch Blood Transfus Disord. 2018;1(2).
73. Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, Ojong OE, Odunze U. HIV and TB co-infection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. IOSR J Pharm Biol Sci. 2017;12(4):70-75.
74. Offie DC, Obeagu EI, Akueshi C, Njab JE, Ekanem EE, Dike PN, Oguh DN. Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. Journal of Pharmaceutical Research International. 2021;33(52B):10-19.
75. Obeagu EI, Obeagu GU, Ede MO, Odo EO, Buhari HA. Translation of HIV/AIDS knowledge into behavior change among secondary school adolescents in Uganda: A review. Medicine (Baltimore). 2023;102(49): e36599. doi: 10.1097/MD.0000000000036599. PMID: 38065920; PMCID: PMC10713174.
76. Anyiam AF, Arinze-Anyiam OC, Irondi EA, Obeagu EI. Distribution of ABO and rhesus blood grouping with HIV infection among blood donors in Ekiti State Nigeria. Medicine

(Baltimore). 2023;102(47): e36342. doi: 10.1097/MD.0000000000036342. PMID: 38013335; PMCID: PMC10681551.
77. Echefu SN, Udosen JE, Akwiwu EC, Akpotuzor JO, Obeagu EI. Effect of Dolutegravir regimen against other regimens on some hematological parameters, CD4 count and viral load of people living with HIV infection in South Eastern Nigeria. Medicine (Baltimore). 2023;102(47): e35910. doi: 10.1097/MD.0000000000035910. PMID: 38013350; PMCID: PMC10681510.
78. Opeyemi AA, Obeagu EI. Regulations of malaria in children with human immunodeficiency virus infection: A review. Medicine (Baltimore). 2023;102(46): e36166. doi: 10.1097/MD.0000000000036166. PMID: 37986340; PMCID: PMC10659731.
79. Obeagu EI, Obeagu GU, Obiezu J, Ezeonwumelu C, Ogunnaya FU, Ngwoke AO, Emeka-Obi OR,
80. Obeagu EI, Ubosi NI, Uzoma G. Storms and Struggles: Managing HIV Amid Natural Disasters. Int. J. Curr. Res. Chem. Pharm. Sci. 2023;10(11):14-25.
81. Obeagu EI, Obeagu GU. Human Immunodeficiency Virus and tuberculosis infection: A review of prevalence of associated factors. Int. J. Adv. Multidiscip. Res. 2023;10(10):56-62.
82. Obeagu EI, Obeagu GU. Unmasking the Truth: Addressing Stigma in the Fight Against HIV. Elite Journal of Public Health. 2024;2(1):8-22.
83. Obeagu EI, Obeagu GU, Okwuanaso CB. Optimizing Immune Health in HIV Patients through Nutrition: A Review. Elite Journal of Immunology. 2024;2(1):14-33.
84. Obeagu EI, Obeagu GU. Utilization of immunological ratios in HIV: Implications for monitoring and therapeutic strategies. Medicine. 2024;103(9): e37354.
85. Obeagu EI, Obeagu GU. CD8 Dynamics in HIV Infection: A Synoptic Review. Elite Journal of Immunology. 2024;2(1):1-3.
86. Obeagu EI, Obeagu GU. Implications of B Lymphocyte Dysfunction in HIV/AIDS. Elite Journal of Immunology. 2024;2(1):34-46.
87. Obeagu EI, Obeagu GU. Maternal Influence on Infant Immunological Responses to HIV: A Review. Elite Journal of Laboratory Medicine. 2024;2(1):46-58.
88. Obeagu EI, Obeagu GU. Understanding B Lymphocyte Functions in HIV Infection: Implications for Immune Dysfunction and Therapeutic Strategies. Elite Journal of Medicine. 2024;2(1):35-46.
89. Obeagu EI, Obeagu GU. Platelet-Driven Modulation of HIV: Unraveling Interactions and Implications. Journal home page: http://www. journalijiar. com.;12(01).
90. Obeagu EI, Anyiam AF, Obeagu GU. Managing Hematological Complications in HIV: Erythropoietin Considerations. Elite Journal of HIV. 2024;2(1):65-78.
91. Obeagu EI, Obeagu GU, Hauwa BA, Umar AI. Hematocrit Variations in HIV Patients Co-infected with Malaria: A Comprehensive Review. Journal home page: http://www. journalijiar. com.;12(01).

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

92. Obeagu EI, Obeagu GU. Synergistic Effects of Blood Transfusion and HIV in Children Under 5 Years with Severe Malaria: A Review. Elite Journal of HIV. 2024;2(1):31-50.
93. Obeagu EI, Anyiam AF, Obeagu GU. Unveiling B Cell Mediated Immunity in HIV Infection: Insights, Challenges, and Potential Therapeutic Avenues. Elite Journal of HIV. 2024;2(1):1-5.
94. Obeagu EI, Obeagu GU. Hematocrit Fluctuations in HIV Patients Co-infected with Malaria Parasites: A Comprehensive Review. Int. J. Curr. Res. Med. Sci. 2024;10(1):25-36.
95. Obeagu EI, Obeagu GU. Transfusion Therapy in HIV: Risk Mitigation and Benefits for Improved Patient Outcomes. Sciences. 2024;4(1):32-7.
96. Obeagu EI, Obeagu GU. Mental Health and Psychosocial Effects of natural disaster on HIV Patients. Sciences. 2024;4(1):38-44.
97. Obeagu EI, Obeagu GU. Eosinophil-Associated Changes in Neonatal Thymic T Regulatory Cell Populations in HIV-Infected Pregnancies. Elite Journal of Health Science. 2024;2(1):33-42.
98. Obeagu EI, Obeagu GU. Advances in Understanding the Impact of Blood Transfusion on Anemia Resolution in HIV-Positive Children with Severe Malaria: A Comprehensive Review. Elite Journal of Haematology. 2024;2(1):26-41.
99. Gonzalez VD. Innate and adaptive cellular immunity in chronic HCV and HIV-1 infection. Karolinska Institutet (Sweden); 2009.
100. Obeagu EI, Ayogu EE, Obeagu GU. Interactions between Blood Transfusion and Antiretroviral Medications: Implications for Patient Care. Elite Journal of Medicine. 2024;2(2):104-15.
101. Obeagu EI, Obeagu GU. Maternal Eosinophilic Responses in HIV-Positive Pregnant Women: Unraveling Immunological Dynamics for Improved Maternal-Fetal Health. Elite Journal of Immunology. 2024;2(1):47-64.
102. Obeagu EI, Anyanwu CN, Obeagu GU. Challenges and Considerations in Managing Blood Transfusion for Individuals with HIV. Elite Journal of HIV. 2024;2(2):1-7.
103. Obeagu EI, Ubosi NI, Obeagu GU, Akram M. Early Infant Diagnosis: Key to Breaking the Chain of HIV Transmission. Elite Journal of Public Health. 2024;2(1):52-61.
104. Obeagu EI, Obeagu GU. Understanding Hematocrit Fluctuations in HIV-Malaria Coinfection for Improved Management. Elite Journal of Public Health. 2024;2(1):22-34.
105. Obeagu EI, Obeagu GU. The Impact of Erythropoietin on Preeclampsia in HIV-Positive Women: A Review. Elite Journal of Nursing and Health Science. 2024;2(1):21-31.
106. Obeagu EI, Obeagu GU. Platelet Distribution Width (PDW) as a Prognostic Marker for Anemia Severity in HIV Patients: A Comprehensive Review. Journal home page: http://www. journalijiar. com.;12(01).
107. Obeagu EI, Obeagu GU. Neonatal Outcomes in Children Born to Mothers with Severe Malaria, HIV, and Transfusion History: A Review. Elite Journal of Nursing and Health Science. 2024;2(3):38-58.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

108. Obeagu EI, Obeagu GU. Assessing Platelet Functionality in HIV Patients Receiving Antiretroviral Therapy: Implications for Risk Assessment. Elite Journal of HIV. 2024;2(3):14-26.
109. Obeagu EI, Obeagu GU. Advancements in HIV Prevention: Africa's Trailblazing Initiatives and Breakthroughs. Elite Journal of Public Health. 2024;2(1):52-63.
110. Obeagu EI, Obeagu GU. Maternal Influence on Infant Immunological Responses to HIV: A Review. Elite Journal of Laboratory Medicine. 2024;2(1):46-58.
111. Obeagu EI, Obeagu GU. Counting Cells, Shaping Fates: CD4/CD8 Ratios in HIV. Elite Journal of Scientific Research and Review. 2024;2(1):37-50.
112. Obeagu EI, Anyiam AF, Obeagu GU. Managing Hematological Complications in HIV: Erythropoietin Considerations. Elite Journal of HIV. 2024;2(1):65-78.
113. Obeagu EI, Obeagu GU. Immune Modulation in HIV-Positive Neonates: Insights and Implications for Clinical Management. Elite Journal of Nursing and Health Science. 2024;2(3):59-72.
114. Obeagu EI, Ayogu EE, Obeagu GU. Impact on Viral Load Dynamics: Understanding the Interplay between Blood Transfusion and Antiretroviral Therapy in HIV Management. Elite Journal of Nursing and Health Science. 2024;2(2):5-15.
115. Obeagu EI, Obeagu GU. Understanding B Lymphocyte Functions in HIV Infection: Implications for Immune Dysfunction and Therapeutic Strategies. Elite Journal of Medicine. 2024;2(1):35-46.
116. Obeagu EI, Anyanwu CN, Obeagu GU. Challenges and Considerations in Managing Blood Transfusion for Individuals with HIV. Elite Journal of HIV. 2024;2(2):1-7.
117. Obeagu EI, Obeagu GU. Understanding ART and Platelet Functionality: Implications for HIV Patients. Elite Journal of HIV. 2024;2(2):60-73.
118. Obeagu EI, Obeagu GU. The Role of Blood Transfusion Strategies in HIV Management: Current Insights and Future Directions. Elite Journal of Medicine. 2024;2(1):10-22.
119. Obeagu EI, AmaezeAA O, Obeagu GU. B Cell Deficiency and Implications in HIV Pathogenesis: Unraveling the Complex Interplay. Elite Journal of Nursing and Health Science. 2024;2(2):33-46.
120. Scott JA, Chew KW. Treatment optimization for HIV/HCV co-infected patients. Therapeutic advances in infectious disease. 2017;4(1):18-36.
121. Pooranagangadevi N, Padmapriyadarsini C. Treatment of tuberculosis and the drug interactions associated with HIV-TB co-infection treatment. Frontiers in Tropical Diseases. 2022; 3:834013.
122. Obeagu EI, Obeagu GU. Eosinophil Dynamics in Pregnancy among Women Living with HIV: A Comprehensive Review. Int. J. Curr. Res. Med. Sci. 2024;10(1):11-24.
123. Obeagu EI, Obeagu GU. Hematocrit Fluctuations in HIV Patients Co-infected with Malaria Parasites: A Comprehensive Review. Int. J. Curr. Res. Med. Sci. 2024;10(1):25-36.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

124. Obeagu EI, Obeagu GU. Unveiling the Role of Innate Immune Activation in Pediatric HIV: A Review. Elite Journal of Immunology. 2024;2(3):33-44.
125. Obeagu EI, Obeagu GU. Harnessing B Cell Responses for Personalized Approaches in HIV Management. Elite Journal of Immunology. 2024;2(2):15-28.
126. Obeagu EI, Obeagu GU, Hauwa BA, Umar AI. Neutrophil Dynamics: Unveiling Their Role in HIV Progression within Malaria Patients. Journal home page: http://www. journalijiar. com.;12(01).
127. Obeagu EI, Obeagu GU, Hauwa BA, Umar AI. Hematocrit Variations in HIV Patients Co-infected with Malaria: A Comprehensive Review. Journal home page: http://www. journalijiar. com.;12(01).
128. Obeagu EI, Anyiam AF, Obeagu GU. Managing Anemia in HIV through Blood Transfusions: Clinical Considerations and Innovations. Elite Journal of HIV. 2024;2(1):16-30.
129. Obeagu EI, Obeagu GU. Maternal Eosinophilic Responses in HIV-Positive Pregnant Women: Unraveling Immunological Dynamics for Improved Maternal-Fetal Health. Elite Journal of Immunology. 2024;2(1):47-64.
130. Obeagu EI, Obeagu GU. Platelet Aberrations in HIV Patients: Assessing Impacts of ART. Elite Journal of Haematology, 2024; 2 (3).:10-24.
131. Obeagu EI, Obeagu GU. Hematological Changes Following Blood Transfusion in Young Children with Severe Malaria and HIV: A Critical Review. Elite Journal of Laboratory Medicine. 2024;2(1):33-45.
132. Obeagu EI, Anyiam AF, Obeagu GU. Erythropoietin Therapy in HIV-Infected Individuals: A Critical Review. Elite Journal of HIV. 2024;2(1):51-64.
133. Obeagu EI, Ubosi NI, Obeagu GU, Obeagu AA. Nutritional Strategies for Enhancing Immune Resilience in HIV: A Review. Int. J. Curr. Res. Chem. Pharm. Sci. 2024;11(2):41-51.
134. Obeagu EI, Obeagu GU. The Crucial Role of Erythropoietin in Managing Anemia in HIV: A Review. Elite Journal of Scientific Research and Review. 2024;2(1):24-36.
135. Obeagu EI, Obeagu GU. Impact of Maternal Eosinophils on Neonatal Immunity in HIV-Exposed Infants: A Review. Elite Journal of Immunology. 2024;2(3):1-8.
136. Obeagu EI, Anyiam AF, Obeagu GU. Unveiling B Cell Mediated Immunity in HIV Infection: Insights, Challenges, and Potential Therapeutic Avenues. Elite Journal of HIV. 2024;2(1):1-5.
137. Obeagu EI, Obeagu GU. Anemia and Erythropoietin: Key Players in HIV Disease Progression. Elite Journal of Haematology, 2024; 2 (3).:42-57.
138. Obeagu EI, Obeagu GU. Platelet Dysfunction in HIV Patients: Assessing ART Risks. Elite Journal of Scientific Research and Review. 2024;2(1):1-6.
139. Obeagu EI, Ubosi NI, Obeagu GU, Akram M. Early Infant Diagnosis: Key to Breaking the Chain of HIV Transmission. Elite Journal of Public Health. 2024;2(1):52-61.
140. Obeagu EI, Obeagu GU. Transfusion Therapy in HIV: Risk Mitigation and Benefits for Improved Patient Outcomes. Sciences. 2024;4(1):32-7.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

141. Obeagu EI, Obeagu GU. P-Selectin and Immune Activation in HIV: Clinical Implications. Elite Journal of Health Science. 2024;2(2):16-29.
142. Obeagu EI, Obeagu GU. Mental Health and Psychosocial Effects of natural disaster on HIV Patients. Sciences. 2024;4(1):38-44.
143. Obeagu EI, Obeagu GU. Optimizing Blood Transfusion Protocols for Breast Cancer Patients Living with HIV: A Comprehensive Review. Elite Journal of Nursing and Health Science. 2024;2(2):1-7.
144. Obeagu EI, Obeagu GU. Advances in Understanding the Impact of Blood Transfusion on Anemia Resolution in HIV-Positive Children with Severe Malaria: A Comprehensive Review. Elite Journal of Haematology. 2024;2(1):26-41.
145. Obeagu EI, Obeagu GU. Transfusion-Related Complications in Children Under 5 with Coexisting HIV and Severe Malaria: A Review. Int. J. Curr. Res. Chem. Pharm. Sci. 2024;11(2):9-19.
146. Obeagu EI, Obeagu GU. Impact of Blood Transfusion on Viral Load Dynamics in HIV-Positive Neonates with Severe Malaria: A Review. Elite Journal of Scientific Research and Review. 2024;2(1):42-60.
147. Obeagu EI, Ayogu EE, Obeagu GU. Interactions between Blood Transfusion and Antiretroviral Medications: Implications for Patient Care. Elite Journal of Medicine. 2024;2(2):104-5.
148. Obeagu EI, Obeagu GU. P-Selectin Expression in HIV-Associated Coagulopathy: Implications for Treatment. Elite Journal of Haematology, 2024; 2 (3).:25-41.
149. Obeagu EI, Obeagu GU. Eosinophil-Associated Changes in Neonatal Thymic T Regulatory Cell Populations in HIV-Infected Pregnancies. Elite Journal of Health Science. 2024;2(1):33-42.
150. Obeagu EI, Obeagu GU. Exploring the Role of L-selectin in HIV-related Immune Exhaustion: Insights and Therapeutic Implications. Elite Journal of HIV. 2024;2(2):43-59.
151. Obeagu EI. Erythropoietin and the Immune System: Relevance in HIV Management. Elite Journal of Health Science. 2024;2(3):23-35.
152. Obeagu EI, Obeagu GU. The Impact of Erythropoietin on Preeclampsia in HIV-Positive Women: A Review. Elite Journal of Nursing and Health Science. 2024;2(1):21-31.
153. Obeagu EI, Obeagu GU. Unraveling the Role of Eosinophil Extracellular Traps (EETs) in HIV-Infected Pregnant Women: A Review. Elite Journal of Nursing and Health Science. 2024;2(3):84-99.
154. Obeagu EI, Obeagu GU. Hematologic Considerations in Breast Cancer Patients with HIV: Insights into Blood Transfusion Strategies. Elite Journal of Health Science. 2024;2(2):20-35.
155. Obeagu EI, Obeagu GU. L-selectin and HIV-Induced Immune Cell Trafficking: Implications for Pathogenesis and Therapeutic Strategies. Elite Journal of Laboratory Medicine. 2024;2(2):30-46.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89

156. Obeagu EI, Obeagu GU. The Intricate Relationship Between Erythropoietin and HIV-Induced Anemia: Unraveling Pathways for Therapeutic Insights. Int. J. Curr. Res. Chem. Pharm. Sci. 2024;11(2):30-40.
157. Obeagu EI, Obeagu GU. The Role of L-selectin in Tuberculosis and HIV Coinfection: Implications for Disease Diagnosis and Management. Elite Journal of Public Health. 2024;2(1):35-51.
158. Kalu OA, Ukibe NR, Onyenekwe CC, Okoyeagu RC, Nnaemeka WS, Onyenekwe AJ, Ukibe EG, Ukibe BC, Ukibe VE, Obeagu EI. Assessment of Serum Cystatin C, Microalbumin Levels and Egfr in HIV Seropositive Individuals based on Age and Gender in NAUTH, Nnewi, Nigeria. Elite Journal of Medicine. 2024;2(3):48-59.
159. Obeagu EI, Obeagu GU. Understanding Immune Cell Trafficking in Tuberculosis-HIV Coinfection: The Role of L-selectin Pathways. Elite Journal of Immunology. 2024;2(2):43-59.
160. Obeagu EI, Obeagu GU. Eosinophilic Changes in Placental Tissues of HIV-Positive Pregnant Women: A Review. Elite Journal of Laboratory Medicine. 2024;2(1):14-32.
161. Obeagu EI, Obeagu GU. P-Selectin and Platelet Activation in HIV: Implications for Antiviral Therapy. Elite Journal of Scientific Research and Review. 2024;2(1):17-41.
162. Obeagu EI, Obeagu GU. Strength in Unity: Building Support Networks for HIV Patients in Uganda. Elite Journal of Medicine. 2024;2(1):1-6.
163. Obeagu EI, GU EE. Understanding the Intersection of Highly Active Antiretroviral Therapy and Platelets in HIV Patients: A Review. Elite Journal of Haematology, 2024; 2 (3).:111-7.

Citation: Obeagu EI, Ngomo SSI. Erythrocyte Morphology in Hemophilia Patients Co-infected with HIV: A Review. *Elite Journal of Haematology, 2024; 2(5):* 72-89