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Aplastic Anemia and HIV: Clinical Features and Risk Factors

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Abstract

Aplastic anemia, a rare but serious hematological disorder characterized by bone marrow failure, has emerged as a recognized complication in individuals living with HIV/AIDS. This review provides a comprehensive analysis of the clinical features and risk factors associated with the development of aplastic anemia in the context of HIV infection. The pathophysiological mechanisms underlying aplastic anemia in individuals living with HIV remain incompletely understood but are believed to involve HIV-induced immunosuppression and dysregulation of the immune system. Direct viral toxicity, immune-mediated destruction of hematopoietic stem cells, and the release of pro-inflammatory cytokines have been implicated in the pathogenesis of aplastic anemia. Clinical manifestations of aplastic anemia in individuals with HIV infection can vary widely, ranging from asymptomatic pancytopenia to severe cytopenias with life-threatening complications. Fatigue, weakness, pallor, mucosal bleeding, petechiae, and recurrent infections are common clinical features. Prompt recognition and intervention are essential to prevent further morbidity and mortality in severe cases of aplastic anemia, emphasizing the need for increased awareness and vigilance among healthcare providers caring for HIV-infected individuals. Several risk factors have been identified for the development of aplastic anemia in individuals living with HIV, including advanced HIV disease, low CD4 cell counts, high viral load, concomitant opportunistic infections, and exposure to myelosuppressive medications. Genetic predisposition and host immune factors may also influence susceptibility to aplastic anemia.

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Introduction

Aplastic anemia represents a rare yet severe hematological disorder characterized by bone marrow failure, resulting in diminished production of red blood cells, white blood cells, and platelets. While idiopathic aplastic anemia and exposure to certain drugs or toxins are well-recognized etiological factors, emerging evidence has identified HIV infection as a potential trigger for aplastic anemia. The intersection of aplastic anemia and HIV/AIDS poses unique challenges for healthcare providers, necessitating a thorough understanding of the interplay between these two conditions. HIV-induced immunosuppression and dysregulation of the immune system have been implicated in the pathogenesis of aplastic anemia, leading to impaired hematopoiesis and bone marrow failure. However, the precise mechanisms underlying aplastic anemia in the context of HIV infection remain incompletely understood, highlighting the need for further research to elucidate these mechanisms and inform targeted therapeutic interventions.[1-12]

Clinically, individuals with HIV infection may present with a spectrum of hematological abnormalities, ranging from cytopenias related to HIV itself to bone marrow suppression secondary to opportunistic infections or medications. Aplastic anemia in individuals living with HIV can manifest with varying degrees of severity, from mild pancytopenia to severe cytopenias with life-threatening complications such as hemorrhage and infections. Timely recognition and intervention are crucial to prevent further morbidity and mortality in these individuals, underscoring the importance of heightened clinical awareness and vigilance. Diagnosing aplastic anemia in individuals with HIV infection requires a comprehensive evaluation, including a detailed medical history, physical examination, laboratory testing, and bone marrow examination. Peripheral blood counts demonstrating pancytopenia, along with a hypocellular bone marrow on biopsy, are key diagnostic criteria. However, distinguishing aplastic anemia from other causes of bone marrow failure, such as infections, toxins, or autoimmune disorders, can pose diagnostic challenges, highlighting the importance of a systematic approach to diagnosis. Several risk factors have been implicated in the development of aplastic anemia in individuals living with HIV/AIDS, including advanced HIV disease, low CD4 cell counts, high viral load, concomitant opportunistic infections, and exposure to myelosuppressive medications. Genetic predisposition and host immune factors may also influence susceptibility to aplastic anemia. Identifying and mitigating these risk factors are essential for preventing the development of aplastic anemia and optimizing patient outcomes in this vulnerable population.[13-27]

Pathophysiological Mechanisms

The pathophysiological mechanisms underlying aplastic anemia in individuals living with HIV/AIDS are multifaceted and involve a complex interplay between viral infection, immune

dysregulation, and bone marrow suppression. HIV infection is known to induce profound immunosuppression by targeting CD4+ T lymphocytes, leading to a state of chronic immune activation and dysfunction. This immune dysregulation not only compromises the body's ability to mount an effective antiviral response but also disrupts normal hematopoiesis, contributing to the development of aplastic anemia. Direct viral toxicity is one proposed mechanism by which HIV may contribute to bone marrow failure and aplastic anemia. HIV has been shown to infect hematopoietic progenitor cells and bone marrow stromal cells, disrupting their function and impairing hematopoiesis. Additionally, HIV-encoded proteins, such as Tat and gp120, can induce apoptosis of hematopoietic cells and inhibit their proliferation, further exacerbating bone marrow suppression.[29-40]

Immune-mediated destruction of hematopoietic stem cells is another proposed mechanism underlying aplastic anemia in individuals with HIV/AIDS. Chronic immune activation and dysregulation in HIV-infected individuals may lead to aberrant activation of cytotoxic T cells and natural killer cells, resulting in the destruction of hematopoietic progenitor cells in the bone marrow. Furthermore, dysregulation of cytokine signaling, including elevated levels of pro-inflammatory cytokines such as tumor necrosis factor-alpha (TNF-α) and interferon-gamma (IFN-γ), may contribute to the pathogenesis of aplastic anemia by promoting apoptosis of hematopoietic cells and inhibiting their differentiation. In addition to direct viral effects and immune-mediated mechanisms, dysregulation of the bone marrow microenvironment may also play a role in the pathogenesis of aplastic anemia in individuals living with HIV/AIDS. HIV-induced inflammation and fibrosis within the bone marrow niche can disrupt the supportive microenvironment necessary for hematopoietic stem cell maintenance and differentiation. Furthermore, alterations in the expression of chemokines, growth factors, and adhesion molecules within the bone marrow microenvironment may impair hematopoietic stem cell homing, proliferation, and differentiation, contributing to bone marrow failure.[41-55]

Clinical Manifestations

Clinical manifestations of aplastic anemia in individuals living with HIV/AIDS can vary widely in severity and presentation, ranging from asymptomatic cytopenias to life-threatening complications. The hallmark feature of aplastic anemia is pancytopenia, characterized by reduced counts of red blood cells, white blood cells, and platelets in the peripheral blood. However, the clinical manifestations may be nonspecific and overlap with those of HIV infection or other hematological disorders, making diagnosis challenging. Symptoms of aplastic anemia may include fatigue, weakness, pallor, and exertional dyspnea due to anemia resulting from decreased red blood cell production. Patients may also experience recurrent or severe infections due to neutropenia, which predisposes them to bacterial, fungal, and viral infections. Mucosal bleeding, petechiae, ecchymoses, and purpura may occur as a consequence of thrombocytopenia, leading to an increased risk of spontaneous bleeding or prolonged bleeding after minor trauma. Additionally,

patients may present with signs of bone marrow failure, such as fever, night sweats, and bone pain, reflecting the underlying hematological dysfunction.[56-69]

In severe cases of aplastic anemia, patients may develop life-threatening complications, including hemorrhage, sepsis, and organ failure. Hemorrhagic manifestations can range from mild mucosal bleeding to severe gastrointestinal bleeding, intracranial hemorrhage, or hemodynamic instability. Sepsis can occur secondary to opportunistic infections resulting from neutropenia, posing a significant risk of morbidity and mortality. Furthermore, complications such as acute respiratory distress syndrome (ARDS), acute kidney injury (AKI), and disseminated intravascular coagulation (DIC) may arise in the setting of severe bone marrow suppression and immune dysregulation. Diagnosis of aplastic anemia in individuals living with HIV/AIDS requires a comprehensive evaluation, including a detailed medical history, physical examination, and laboratory testing. Peripheral blood counts typically demonstrate pancytopenia, with decreased levels of hemoglobin, white blood cells, and platelets. Bone marrow examination is essential for confirming the diagnosis, demonstrating hypocellularity with decreased numbers of hematopoietic precursor cells. However, bone marrow examination may be deferred or delayed in the presence of active HIV infection or severe thrombocytopenia due to the risk of bleeding complications.[70-85]

Diagnostic Criteria

The diagnosis of aplastic anemia in individuals living with HIV/AIDS requires a comprehensive evaluation that includes clinical assessment, laboratory testing, and bone marrow examination. Aplastic anemia is characterized by pancytopenia, with decreased levels of red blood cells (anemia), white blood cells (leukopenia), and platelets (thrombocytopenia) in the peripheral blood. Hemoglobin levels are typically below the reference range, with absolute neutrophil counts and platelet counts similarly decreased. The degree of cytopenia may vary, ranging from mild to severe, depending on the extent of bone marrow suppression. Bone marrow examination is essential for confirming the diagnosis of aplastic anemia and assessing the degree of bone marrow suppression. Bone marrow biopsy typically reveals hypocellularity, with markedly reduced numbers of hematopoietic precursor cells and an absence of significant reticulin fibrosis or infiltration by malignant cells. The presence of less than 25% cellularity in the bone marrow, along with reduced numbers of hematopoietic precursors, is consistent with the diagnosis of aplastic anemia. The diagnosis of aplastic anemia requires the exclusion of other potential causes of bone marrow failure, such as infections, toxins, medications, autoimmune disorders, and malignancies. Laboratory testing may include serological assays for infectious agents, assessment of toxic exposures, evaluation of autoimmune markers, and screening for hematologic malignancies. In individuals living with HIV/AIDS, differentiation from HIV-related cytopenias and opportunistic infections is particularly important.[86-106]

Aplastic anemia is characterized by a hypocellular bone marrow without significant dysplastic changes in the hematopoietic precursors. Dysplastic features, such as abnormal cell morphology,

nuclear abnormalities, or cytogenetic abnormalities, may suggest alternative diagnoses, such as myelodysplastic syndrome (MDS) or leukemia. Therefore, careful examination of bone marrow aspirate and biopsy specimens is essential to rule out dysplastic hematopoiesis. The diagnosis of aplastic anemia should be considered in the appropriate clinical context, particularly in individuals with HIV/AIDS who present with unexplained cytopenias, bone marrow suppression, or signs of bone marrow failure. Close collaboration between hematologists, infectious disease specialists, and HIV care providers is essential to ensure accurate diagnosis and appropriate management of aplastic anemia in this vulnerable population.[107-112]

Risk Factors

Several risk factors have been identified for the development of aplastic anemia in individuals living with HIV/AIDS, shedding light on the multifaceted nature of this hematological complication. Individuals with advanced HIV disease, characterized by low CD4 cell counts and high viral loads, are at increased risk of developing aplastic anemia. HIV-induced immunosuppression and dysregulation of the immune system contribute to bone marrow suppression and impaired hematopoiesis, predisposing individuals to aplastic anemia. Low CD4 cell counts, a hallmark of HIV-induced immunosuppression, have been associated with an elevated risk of aplastic anemia. CD4 cells play a crucial role in immune regulation and hematopoiesis, and their depletion can disrupt normal bone marrow function, leading to bone marrow failure and cytopenias. High HIV viral load, reflecting uncontrolled viral replication and disease progression, is another risk factor for the development of aplastic anemia. Viral replication within the bone marrow and direct viral toxicity to hematopoietic progenitor cells may contribute to bone marrow suppression and the development of cytopenias.[113-122]

Opportunistic infections, common in individuals living with HIV/AIDS, can exacerbate bone marrow suppression and increase the risk of aplastic anemia. Certain opportunistic infections, such as cytomegalovirus (CMV), Epstein-Barr virus (EBV), and mycobacterial infections, may directly affect hematopoietic progenitor cells or induce immune-mediated destruction of bone marrow cells. Exposure to myelosuppressive medications, including antiretroviral therapy (ART) and chemotherapeutic agents used to treat HIV-related malignancies, is a known risk factor for aplastic anemia. Certain ART regimens, particularly those containing zidovudine (AZT) or other nucleoside reverse transcriptase inhibitors (NRTIs), have been associated with bone marrow toxicity and the development of cytopenias. Genetic factors may predispose certain individuals to the development of aplastic anemia in the setting of HIV/AIDS. Polymorphisms in genes involved in immune regulation, hematopoiesis, and drug metabolism may influence susceptibility to bone marrow suppression and the development of cytopenias. Dysregulation of the host immune response, including aberrant activation of cytotoxic T cells, natural killer cells, and pro-inflammatory cytokines, may contribute to bone marrow suppression and the pathogenesis of aplastic anemia in individuals living with HIV/AIDS.[123-132]

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Management Strategies

The management of aplastic anemia in individuals living with HIV/AIDS requires a multidisciplinary approach aimed at addressing underlying bone marrow suppression, managing concurrent HIV infection, and preventing complications associated with cytopenias. Treatment strategies may include supportive care, immunosuppressive therapy, hematopoietic stem cell transplantation (HSCT), and management of underlying HIV infection. Supportive measures are essential for managing complications associated with aplastic anemia and improving quality of life. This may include blood transfusions to correct anemia and thrombocytopenia, antimicrobial therapy to prevent and treat infections, and hematopoietic growth factors, such as erythropoietin and granulocyte colony-stimulating factor (G-CSF), to stimulate red blood cell and white blood cell production. Immunosuppressive therapy, typically with a combination of antithymocyte globulin (ATG) and cyclosporine, is a cornerstone of treatment for aplastic anemia. This regimen aims to suppress aberrant immune responses and promote hematopoietic recovery. However, the use of immunosuppressive therapy in individuals with HIV/AIDS requires careful consideration of potential drug interactions, overlapping toxicities with antiretroviral medications, and risk of opportunistic infections.[133-142]

Hematopoietic Stem Cell Transplantation (HSCT) offers a curative option for individuals with severe or refractory aplastic anemia who have an available matched donor. However, HSCT in individuals living with HIV/AIDS presents unique challenges, including increased risk of graft-versus-host disease (GVHD), opportunistic infections, and HIV-related complications. Selecting appropriate candidates for HSCT and optimizing HIV management before and after transplantation are crucial for successful outcomes. Optimal management of HIV infection is essential for individuals with aplastic anemia and concurrent HIV/AIDS. This may include initiation or optimization of antiretroviral therapy (ART) to suppress viral replication, restore immune function, and reduce the risk of opportunistic infections. Close monitoring of HIV viral load, CD4 cell counts, and ART adherence is necessary to ensure effective HIV control and prevent HIV-related complications. Prevention of complications associated with aplastic anemia, such as infections and bleeding, is paramount. This may involve prophylactic antimicrobial therapy, infection control measures, and regular monitoring of hematologic parameters to detect and manage cytopenias promptly. Additionally, avoiding myelotoxic medications and environmental exposures is important for minimizing further bone marrow suppression. Psychological support, nutritional counseling, and social services play a crucial role in supporting individuals living with HIV/AIDS and aplastic anemia. Addressing psychosocial needs, providing nutritional support, and connecting patients with community resources can help improve treatment adherence, quality of life, and overall well-being.[143-151]

Conclusion

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Aplastic anemia represents a significant hematological complication in individuals living with HIV/AIDS, characterized by bone marrow failure and pancytopenia. Supportive care measures, including blood transfusions, antimicrobial therapy, and hematopoietic growth factors, play a crucial role in managing symptoms and improving quality of life. Immunosuppressive therapy, typically with antithymocyte globulin and cyclosporine, is a cornerstone of treatment for individuals with aplastic anemia, aiming to suppress aberrant immune responses and promote hematopoietic recovery. However, the use of immunosuppressive therapy in the context of HIV/AIDS requires careful consideration of potential drug interactions and overlapping toxicities with antiretroviral medications.

Hematopoietic stem cell transplantation offers a curative option for individuals with severe or refractory aplastic anemia but presents unique challenges in individuals living with HIV/AIDS, including increased risk of graft-versus-host disease and opportunistic infections. Optimal management of HIV infection is essential for individuals with aplastic anemia and concurrent HIV/AIDS, requiring initiation or optimization of antiretroviral therapy to suppress viral replication and restore immune function. Prevention of complications associated with aplastic anemia, such as infections and bleeding, is paramount, necessitating prophylactic antimicrobial therapy, infection control measures, and close monitoring of hematologic parameters. Additionally, psychosocial support, nutritional counseling, and social services play a crucial role in supporting individuals living with HIV/AIDS and aplastic anemia, addressing their unique needs and improving treatment adherence and quality of life.

References

1. Gaman A, Gaman G, Bold A. Acquired aplastic anemia: correlation between etiology, pathophysiology, bone marrow histology and prognosis factors. Rom J Morphol Embryol. 2009;50(4):669-674.
2. Young NS. Current concepts in the pathophysiology and treatment of aplastic anemia. Hematology 2013, the American Society of Hematology Education Program Book. 2013; (1):76-81.
3. Miano M, Dufour C. The diagnosis and treatment of aplastic anemia: a review. International journal of hematology. 2015; 101:527-535.
4. Wang L, Liu H. Pathogenesis of aplastic anemia. Hematology. 2019;24(1):559-566.
5. Chinelo OV, Chukwuka E, Ifeoma AC. Causes of anemia due to diminished red blood cell production in pediatrics. International Journal of Scientific Advances (IJSCIA). 2022;3(5):711-718.
6. Young NS, Calado RT, Scheinberg P. Current concepts in the pathophysiology and treatment of aplastic anemia. Blood. 2006;108(8):2509-2519.
7. Furlong E, Carter T. Aplastic anaemia: Current concepts in diagnosis and management. Journal of paediatrics and child health. 2020;56(7):1023-1028.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

8. 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.
9. 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.
10. 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.
11. 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.
12. 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
13. 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.
14. 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.
15. 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.
16. 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.
17. 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.
18. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

19. 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
20. 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
21. 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.
22. 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.
23. 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.
24. 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
25. 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
26. 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.
27. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

28. Obeagu EI, Obeagu GU. GATA-1 and Bone Marrow Failure Syndromes in the Context of HIV Infection: A Review of Molecular Mechanisms and Therapeutic Implications. Elite Journal of Laboratory Medicine. 2024;2(3):39-56.
29. Hammond S, Thomson PJ, Ogese MO, Naisbitt DJ. T-cell activation by low molecular weight drugs and factors that influence susceptibility to drug hypersensitivity. Chemical Research in Toxicology. 2019;33(1):77-94.
30. Sucher R, Kurz K, Margreiter R, Fuchs D, Brandacher G. Antiviral activity of interferon-γ involved in impaired immune function in infectious diseases. Pteridines. 2013;24(3-4):149-164.
31. 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.
32. 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.
33. 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.
34. 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.
35. 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
36. 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.
37. 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

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

https://www.academia.edu/download/54317126/Haematological_indices_of_malaria_patients_coinfected_with_HIV.pdf

38. 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.
39. 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.
40. 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.
41. 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/.
42. 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.
43. 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
44. 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
45. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

46. 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.
47. 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.
48. 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.
49. 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.
50. 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.
51. 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.
52. 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. 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.
53. 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.
54. 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.
55. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

56. Vishnu P, Aboulafia DM. Haematological manifestations of human immune deficiency virus infection. British journal of haematology. 2015;171(5):695-709.
57. 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.
58. 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.
59. 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.
60. 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.
61. 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).
62. 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.
63. 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.
64. 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.
65. 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.
66. 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.
67. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

68. Obeagu EI, Obeagu GU, Obiezu J, Ezeonwumelu C, Ogunnaya FU, Ngwoke AO, Emeka-Obi OR,
69. 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.
70. 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.
71. Obeagu EI, Obeagu GU. Unmasking the Truth: Addressing Stigma in the Fight Against HIV. Elite Journal of Public Health. 2024;2(1):8-22.
72. 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.
73. Obeagu EI, Obeagu GU. Utilization of immunological ratios in HIV: Implications for monitoring and therapeutic strategies. Medicine. 2024;103(9): e37354.
74. Obeagu EI, Obeagu GU. CD8 Dynamics in HIV Infection: A Synoptic Review. Elite Journal of Immunology. 2024;2(1):1-3.
75. Obeagu EI, Obeagu GU. Implications of B Lymphocyte Dysfunction in HIV/AIDS. Elite Journal of Immunology. 2024;2(1):34-46.
76. Obeagu EI, Obeagu GU. Maternal Influence on Infant Immunological Responses to HIV: A Review. Elite Journal of Laboratory Medicine. 2024;2(1):46-58.
77. 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.
78. Obeagu EI, Obeagu GU. Platelet-Driven Modulation of HIV: Unraveling Interactions and Implications. Journal home page: http://www. journalijiar. com.;12(01).
79. Obeagu EI, Anyiam AF, Obeagu GU. Managing Hematological Complications in HIV: Erythropoietin Considerations. Elite Journal of HIV. 2024;2(1):65-78.
80. 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).
81. 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.
82. 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.
83. 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.
84. Obeagu EI, Obeagu GU. Transfusion Therapy in HIV: Risk Mitigation and Benefits for Improved Patient Outcomes. Sciences. 2024;4(1):32-7.
85. Obeagu EI, Obeagu GU. Mental Health and Psychosocial Effects of natural disaster on HIV Patients. Sciences. 2024;4(1):38-44.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

86. Pande A, Bhattacharyya M, Pain S, Ghosh B, Saha S, Ghosh A, Banerjee A. Anemia in antiretroviral naïve HIV/AIDS patients: a study from Eastern India. Online J Health Allied Scs. 2011;10(4):4.
87. 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.
88. 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.
89. 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.
90. 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.
91. 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.
92. 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.
93. Obeagu EI, Obeagu GU. Understanding Hematocrit Fluctuations in HIV-Malaria Coinfection for Improved Management. Elite Journal of Public Health. 2024;2(1):22-34.
94. 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.
95. 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).
96. 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.
97. 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.
98. Obeagu EI, Obeagu GU. Advancements in HIV Prevention: Africa's Trailblazing Initiatives and Breakthroughs. Elite Journal of Public Health. 2024;2(1):52-63.
99. Obeagu EI, Obeagu GU. Maternal Influence on Infant Immunological Responses to HIV: A Review. Elite Journal of Laboratory Medicine. 2024;2(1):46-58.
100. 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.
101. Obeagu EI, Anyiam AF, Obeagu GU. Managing Hematological Complications in HIV: Erythropoietin Considerations. Elite Journal of HIV. 2024;2(1):65-78.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

102. 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.
103. 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.
104. 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.
105. 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.
106. Obeagu EI, Obeagu GU. Understanding ART and Platelet Functionality: Implications for HIV Patients. Elite Journal of HIV. 2024;2(2):60-73.
107. Votavova H, Belickova M. Hypoplastic myelodysplastic syndrome and acquired aplastic anemia: Immune-mediated bone marrow failure syndromes. International journal of oncology. 2022;60(1):1-5.
108. 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.
109. 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.
110. 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.
111. 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.
112. 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.
113. Obeagu EI, Obeagu GU. Harnessing B Cell Responses for Personalized Approaches in HIV Management. Elite Journal of Immunology. 2024;2(2):15-28.
114. 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).
115. 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).
116. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

117. 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.
118. Obeagu EI, Obeagu GU. Platelet Aberrations in HIV Patients: Assessing Impacts of ART. Elite Journal of Haematology, 2024; 2 (3).:10-24.
119. 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.
120. Obeagu EI, Anyiam AF, Obeagu GU. Erythropoietin Therapy in HIV-Infected Individuals: A Critical Review. Elite Journal of HIV. 2024;2(1):51-64.
121. 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.
122. 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.
123. 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.
124. 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.
125. Obeagu EI, Obeagu GU. Anemia and Erythropoietin: Key Players in HIV Disease Progression. Elite Journal of Haematology, 2024; 2 (3).:42-57.
126. Obeagu EI, Obeagu GU. Platelet Dysfunction in HIV Patients: Assessing ART Risks. Elite Journal of Scientific Research and Review. 2024;2(1):1-6.
127. 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.
128. Obeagu EI, Obeagu GU. Transfusion Therapy in HIV: Risk Mitigation and Benefits for Improved Patient Outcomes. Sciences. 2024;4(1):32-7.
129. Obeagu EI, Obeagu GU. P-Selectin and Immune Activation in HIV: Clinical Implications. Elite Journal of Health Science. 2024;2(2):16-29.
130. Obeagu EI, Obeagu GU. Mental Health and Psychosocial Effects of natural disaster on HIV Patients. Sciences. 2024;4(1):38-44.
131. 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.
132. 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.
133. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

134. 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.
135. 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.
136. Obeagu EI, Obeagu GU. P-Selectin Expression in HIV-Associated Coagulopathy: Implications for Treatment. Elite Journal of Haematology, 2024; 2 (3).:25-41.
137. 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.
138. 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.
139. Obeagu EI. Erythropoietin and the Immune System: Relevance in HIV Management. Elite Journal of Health Science. 2024;2(3):23-35.
140. 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.
141. 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.
142. 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.
143. 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.
144. 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.
145. 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.
146. 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.
147. 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.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38

148. 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.
149. 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.
150. Obeagu EI, Obeagu GU. Strength in Unity: Building Support Networks for HIV Patients in Uganda. Elite Journal of Medicine. 2024;2(1):1-6.
151. 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).:111-117.

Citation: Obeagu EI. Aplastic Anemia and HIV: Clinical Features and Risk Factors. *Elite Journal of Haematology, 2024; 2(5):* 20-38