



Eosinophil Count Fluctuations during Pregnancy in Women with HIV: A Comprehensive Review

Emmanuel Ifeanyi Obeagu^{1*} and Getrude Uzoma Obeagu²

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

²School of Nursing Science, Kampala International University, Uganda

***Corresponding author:** Emmanuel Ifeanyi Obeagu, Department of Medical Laboratory Science, Kampala International University, Kampala, Uganda, Tel: +2348037369912; Email: emmanuelobeagu@yahoo.com; obeagu.emmanuel@kiu.ac.ug

Review Article

Volume 8 Issue 1

Received Date: February 22, 2024

Published Date: March 07, 2024

DOI: 10.23880/hij-16000240

Abstract

Pregnancy in women with Human Immunodeficiency Virus (HIV) presents a unique set of challenges, necessitating a closer examination of the immune system's responses, particularly in relation to eosinophil dynamics. This comprehensive review explores the fluctuations in eosinophil counts during pregnancy in HIV-positive women, emphasizing the intricate interplay between the immune system, maternal health, and the risk of vertical transmission. The impact of Antiretroviral Therapy (ART) on eosinophil regulation is also investigated, offering valuable insights into potential therapeutic strategies. By unraveling the complexities of eosinophil dynamics in this specific population, this review aims to contribute to a deeper understanding of maternal immune adaptations and pave the way for targeted interventions to optimize health outcomes for both mothers and infants.

Keywords: Eosinophils; Pregnancy; Women; HIV; Immune System; Maternal Health; Antiretroviral Therapy

Abbreviations: HIV: Human Immunodeficiency Virus; ART: Antiretroviral Therapy.

Introduction

Pregnancy is a dynamic period marked by profound changes in the maternal immune system to accommodate the developing fetus. In the context of Human Immunodeficiency Virus (HIV) infection, these immunological adaptations become more intricate, posing unique challenges for both the mother and the unborn child. Eosinophils, a subset of white blood cells, play a crucial role in the immune response and contribute to the delicate balance required for a successful

pregnancy [1-10]. HIV continues to be a global public health concern, affecting millions of individuals worldwide. In pregnant women, the virus introduces a layer of complexity, as it not only impacts the maternal immune system but also poses the risk of vertical transmission to the fetus. The immunological changes associated with pregnancy, coupled with the immune alterations induced by HIV, necessitate a nuanced examination of specific immune cell populations, such as eosinophils [11-19]. Eosinophils, traditionally recognized for their role in parasitic infections and allergic responses, have emerged as key players in modulating the immune milieu during pregnancy. However, the interplay between eosinophils, pregnancy, and HIV infection remains understudied. Understanding the fluctuations in eosinophil

Maternal Health Implications

counts in HIV-positive pregnant women is essential for unraveling the intricate immunological mechanisms at play and identifying potential biomarkers for disease progression [20-29].

The primary objective of this review is to comprehensively examine the fluctuations in eosinophil counts during pregnancy in women with HIV. By synthesizing existing literature, we aim to shed light on the impact of these fluctuations on maternal health and their potential association with the risk of vertical transmission. Additionally, we will explore the influence of Antiretroviral Therapy (ART) on eosinophil dynamics, providing insights into the implications for therapeutic interventions.

Eosinophils in Pregnancy

The physiological changes that occur during pregnancy extend to the immune system, where a delicate balance is maintained to support the developing fetus while preserving the mother's ability to defend against infections. Eosinophils, a type of granulocyte, are integral components of the immune system with well-known roles in combating parasitic infections and participating in allergic responses [30-38]. During a healthy pregnancy, eosinophil counts undergo dynamic fluctuations in response to hormonal changes and immune adaptations. Research suggests that eosinophils may play a role in modulating immune tolerance, protecting against certain infections, and contributing to tissue repair processes in the placenta and other reproductive tissues. Understanding the baseline dynamics of eosinophils in pregnancy is crucial for discerning abnormal variations in populations with specific health conditions, such as HIV [39-45].

In the context of HIV infection, the intricate balance of immune responses is further complicated. Studies have indicated that women with HIV may experience alterations in eosinophil counts during pregnancy. These changes may be influenced by the direct effects of the virus on immune cells, the impact of antiretroviral therapy (ART), and the heightened susceptibility to infections [46-54]. Elevated or suppressed eosinophil counts in HIV-positive pregnant women may have implications for both maternal and fetal health. Aberrations in eosinophil regulation could potentially compromise the immune defenses against opportunistic infections or contribute to inflammatory processes that influence vertical transmission risks [55-64]. Understanding the specific mechanisms behind eosinophil alterations in HIV-positive pregnancies is an ongoing area of research. Factors such as viral load, immune status, and coexisting conditions may contribute to these variations, necessitating further investigation to unravel the intricate interactions within the immune system during this critical period [65-75].

Eosinophil alterations during pregnancy in women with HIV carry significant implications for maternal health, as these cells are key effectors of the immune response. The immune system undergoes a complex modulation to tolerate the semi-allogenic fetus while maintaining the capacity to defend against infections. In the context of HIV, the virus poses additional challenges by directly impacting immune cells, potentially leading to dysregulation of immune responses [76-78]. Eosinophils, with their immunomodulatory functions, may contribute to shaping the overall immune milieu during pregnancy. Changes in eosinophil counts in HIV-positive women may influence the delicate balance between immune tolerance and the ability to mount effective antiviral defenses. Altered eosinophil dynamics could compromise the immune system's ability to respond to opportunistic infections, posing risks to maternal health [79-88].

Elevated or suppressed eosinophil counts in HIV-positive pregnant women may be linked to the risk of vertical transmission, where the virus is transmitted from mother to child during pregnancy, childbirth, or breastfeeding. Studies have suggested that eosinophils may play a role in influencing viral load in various tissues, impacting the likelihood of transmission [88-92]. Better understanding of the associations between eosinophil counts and vertical transmission risk is essential for refining strategies to prevent mother-to-child transmission of HIV. Monitoring eosinophil dynamics alongside other clinical parameters may offer insights into the effectiveness of interventions, such as antiretroviral therapy, in reducing transmission risks. This knowledge could contribute to personalized approaches to managing HIV-positive pregnancies, ultimately improving outcomes for both the mother and the infant.

Antiretroviral Therapy and Eosinophil Counts

Antiretroviral therapy (ART) has revolutionized the management of HIV, significantly improving the life expectancy and quality of life for individuals living with the virus. However, the specific impact of ART on eosinophil counts during pregnancy in women with HIV remains a topic of ongoing research. Studies have provided conflicting evidence regarding the influence of ART on eosinophil dynamics. Some suggest that certain antiretroviral medications may contribute to alterations in eosinophil counts, potentially affecting the immune response. Conversely, other studies indicate that effective viral suppression through ART might stabilize eosinophil levels, promoting immune homeostasis [93,94].

Understanding the nuanced relationship between ART and eosinophils is essential for optimizing maternal health outcomes. If certain antiretroviral medications are associated with eosinophil alterations, healthcare providers can tailor treatment regimens to minimize potential impacts on the immune system during pregnancy. Conversely, if ART contributes to stabilizing eosinophil counts, it could represent an additional benefit beyond viral suppression.¹⁰⁰ Insights into how ART influences eosinophil dynamics during pregnancy may have broader therapeutic implications. The goal is to strike a delicate balance between achieving effective viral control and maintaining a healthy immune system to safeguard maternal and fetal well-being. Tailoring ART regimens based on individual patient profiles, including eosinophil counts, could be a promising approach. This personalized approach may involve selecting antiretroviral medications with minimal impact on eosinophil levels, ensuring optimal immune function throughout pregnancy. Additionally, monitoring eosinophil counts as part of routine clinical assessments could serve as a valuable tool for gauging the overall health and immune status of pregnant women with HIV [95-103].

Conclusion

Pregnancy in women living with Human Immunodeficiency Virus (HIV) presents a unique intersection of immunological complexities, demanding a nuanced exploration of eosinophil dynamics to optimize maternal health and mitigate the risk of vertical transmission. This review has delved into the intricate relationship between eosinophil counts, pregnancy, and HIV, shedding light on the potential implications for maternal well-being and therapeutic strategies. The fluctuations in eosinophil counts during normal pregnancy underscore the dynamic nature of the immune system's adaptation to support fetal development. In the context of HIV, however, these adaptations become more intricate, and alterations in eosinophil levels may influence the immune response and impact maternal health.

The maternal health implications of eosinophil alterations during pregnancy in women with HIV extend beyond the immune system modulation. Eosinophils, as effectors of the immune response, may play pivotal roles in protecting against opportunistic infections and influencing the risk of vertical transmission. A deeper understanding of these implications is crucial for tailoring interventions that address the unique challenges posed by coexisting HIV and pregnancy. Antiretroviral therapy (ART), while a cornerstone in HIV management, introduces another layer of complexity to the interplay between eosinophils and pregnancy. The impact of ART on eosinophil counts is still an evolving area of research, and the therapeutic implications are yet to be fully

elucidated. Personalizing ART regimens based on individual immune profiles, including eosinophil counts, holds promise for optimizing maternal health outcomes.

References

1. Obeagu EI, Agreen FC (2023) Anaemia among pregnant women: A review of African pregnant teenagers. *J Pub Health Nutri* 6(1): 138.
2. Obeagu EI, Ezimah AC, Obeagu GU (2016) Erythropoietin in the anaemias of pregnancy: a review. *Int J Curr Res Chem Pharm Sci* 3(3): 10-18.
3. Obeagu EI, Adepoju OJ, Okafor CJ, Obeagu GU, Ibekwe AM, et al. (2021) Assessment of Haematological Changes in Pregnant Women of Ido, Ondo State, Nigeria. *J Res Med Dent Sci* 9(4): 145-148.
4. Obeagu EI, Obeagu GU (2023) Sick Cell Anaemia in Pregnancy: A Review. *International Research in Medical and Health Sciences* 6(2): 10-13.
5. Jakheng SP, Obeagu EI (2022) Seroprevalence of human immunodeficiency virus based on demographic and risk factors among pregnant women attending clinics in Zaria Metropolis, Nigeria. *J Pub Health Nutri* 5(6): 127.
6. Obeagu EI, Okwuanaso CB, Edoho SH, Obeagu GU (2022) Under-nutrition among HIV-exposed Uninfected Children: A Review of African Perspective. *Madonna University journal of Medicine and Health Sciences* 2(3): 120-127.
7. Obeagu EI, Alum EU, Obeagu GU (2023) Factors associated with prevalence of HIV among youths: A review of Africa perspective. *Madonna University journal of Medicine and Health Sciences* 3(1): 13-18.
8. Obeagu EI (2023) A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. *Madonna University journal of Medicine and Health Sciences* 3(1): 7-12.
9. Obeagu EI, Obeagu GU (2023) An update on premalignant cervical lesions and cervical cancer screening services among HIV positive women. *J Pub Health Nutri* 6(2): 141.
10. Ezeoru VC, Enweani IB, Ochiabuto O, Nwachukwu AC, Obeagu EI, et al. (2021) Prevalence of Malaria with Anaemia and HIV status in women of reproductive age in Onitsha, Nigeria. *Journal of Pharmaceutical Research International* 33(4): 10-19.
11. Omo EUK, Chinedum OK, Obeagu EI (2017) Evaluation of laboratory logistics management information system

- in HIV/AIDS comprehensive health facilities in Bayelsa State, Nigeria. *Int J Curr Res Med Sci* 3(1): 21-38.
12. Obeagu EI, Obeagu GU, Musiimenta E, Bot YS, Hassan AO (2023) Factors contributing to low utilization of HIV counseling and testing services. *Int J Curr Res Med Sci* 9(2): 1-5.
 13. Obeagu EI, Obeagu GU (2022) An update on survival of people living with HIV in Nigeria. *J Pub Health Nutri* 5(6): 129.
 14. Offie DC, Obeagu EI, Akueshi C, Njab JE, Ekanem EE, et al. (2021) Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. *Journal of Pharmaceutical Research International* 33(52B): 10-19.
 15. Odo M, Ochei KC, Obeagu EI, Barinaadaa A, Eteng UE, et al. (2020) TB Infection Control in TB/HIV Settings in Cross River State, Nigeria: Policy Vs Practice. *Journal of Pharmaceutical Research International* 32(22): 101-119.
 16. Obeagu EI, Eze VU, Alaebob EA, Ochei KC (2016) Determination of haematocrit level and iron profile study among persons living with HIV in Umuahia, Abia State, Nigeria. *J BioInnovation* 5(4): 464-471.
 17. Ifeanyi OE, Obeagu GU (2015) The values of prothrombin time among HIV positive patients in FMC owerri. *International Journal of Current Microbiology and Applied Sciences* 4(4): 911-916.
 18. Izuchukwu IF, Ozims SJ, Agu GC, Obeagu EI, Onu I, et al. (2016) 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* 3(10): 55-65.
 19. Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, et al. (2017) HIV and TB co-infection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. *IOSR J Pharm Biol Sci* 12(4): 70-75.
 20. Oloro OH, Oke TO, Obeagu EI (2022) 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* 2(3): 110-119.
 21. Nwosu DC, Obeagu EI, Nkwocha BC, Nwanna CA, Nwanjo HU, et al. (2016) 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* 5(1): 24-30.
 22. Igwe CM, Obeagu IE, Ogbuabor OA (2022) Clinical characteristics of people living with HIV/AIDS on ART in 2014 at tertiary health institutions in Enugu, Nigeria. *J Pub Health Nutri* 5(6): 130.
 23. Ifeanyi OE, Obeagu GU, Ijeoma FO, Chioma UI (2015) The values of activated partial thromboplastin time (APTT) among HIV positive patients in FMC Owerri. *Int J Curr Res Aca Rev* 3: 139-144.
 24. Obiomah CF, Obeagu EI, Ochei KC, Swem CA, Amachukwu BO (2018) Hematological indices o HIV seropositive subjects in Nnamdi Azikiwe University teaching hospital (NAUTH), Nnewi. *Ann Clin Lab Res* 6(1): 1-4.
 25. Omo EUK, Ochei KC, Osuala EO, Obeagu EI, Onwuasoanya UF (2017) Impact of prevention of mother to child transmission (PMTCT) of HIV on positivity rate in Kafanchan, Nigeria. *Int J Curr Res Med Sci* 3(2): 28-34.
 26. Aizaz M, Abbas FA, Abbas A, Tabassum S, Obeagu EI (2023) Alarming rise in HIV cases in Pakistan: Challenges and future recommendations at hand. *Health Science Reports* 6(8): e1450.
 27. Obeagu EI, Amekpor F, Scott GY (2023) An update of human immunodeficiency virus infection: Bleeding disorders. *J Pub Health Nutri* 6(1): 139.
 28. Obeagu EI, Scott GY, Amekpor F, Ofodile AC, Edoho SH, et al. (2022) Prevention of New Cases of Human Immunodeficiency Virus: Pragmatic Approaches of Saving Life in Developing Countries. *Madonna University journal of Medicine and Health Sciences* 2(3): 128-134.
 29. Walter O, Anaebob QB, Obeagu EI, Okoroiwu IL (2022) Evaluation of Activated Partial Thromboplastin Time and Prothrombin Time in HIV and TB Patients in Owerri Metropolis. *Journal of Pharmaceutical Research International* 34(3A): 29-34.
 30. Obeagu EI, Obeagu GU, Chukwueze CM, Ikpenwa JN, Ramos GF (2022) Evaluation of Protein C, Protein S and Fibrinogen of Pregnant Women with Malaria in Owerri Metropolis. *Madonna University journal of Medicine and Health Sciences* 2(2): 1-9.
 31. Obeagu EI, Obeagu GU, Adepoju OJ (2022) Evaluation of haematological parameters of pregnant women based on age groups in Olorunsogo road area of Ido, Ondo state. *J Bio Innov* 11(3): 936-941.
 32. Obeagu EI (2022) An update on utilization of antenatal care among pregnant Women in Nigeria. *Int J Curr Res Chem Pharm Sci* 9(9): 21-26.

33. Okoroiwu IL, Obeagu EI, Obeagu GU (2022) Determination of clot retraction in pregnant women attending antenatal clinic in federal medical centre Owerri, Nigeria. *Madonna University Journal of Medicine and Health Sciences* 2(2): 91-97.
34. Obeagu EI, Hassan AO, Adepoju OJ, Obeagu GU, Okafor CJ (2021) Evaluation of Changes in Haematological Parameters of Pregnant Women Based on Gestational Age at Olorunsogo Road Area of Ido, Ondo State, Nigeria. *J Res Med Dent Science* 9(9): 363-365.
35. Anyiam AF, Obeagu EI, Obi E, Omosigho PO, Irondi EA, et al. (2022) ABO blood groups and gestational diabetes among pregnant women attending University of Ilorin Teaching Hospital, Kwara State, Nigeria. *International Journal of Research and Reports in Hematology* 5(2): 159-161.
36. Obeagu EI (2023) Gestational Thrombocytopaenia. *J Gynecol Women's Health* 25(3): 556163.
37. Jakheng SP, Obeagu EI, Abdullahi IO, Jakheng EW, Chukwueze CM, et al. (2022) 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* 13(2): 26-31.
38. Obeagu EI, Abdirahman BF, Bunu UO, Obeagu GU (2023) Obstetrics characteristics that effect the newborn outcomes. *Int J Adv Res Biol Sci* 10(3): 134-143.
39. Obeagu EI, Ogunnaya FU (2023) Pregnancy induced Haematological Changes: A Key To Maternal And Child Health. *European Journal of Biomedical* 10(8): 42-43.
40. Okamgba OC, Nwosu DC, Nwobodo EI, Agu GC, Ozims SJ, et al. Iron Status of Pregnant and Post-Partum Women with Malaria Parasitaemia in Aba Abia State, Nigeria. *Annals of Clinical and Laboratory Research* 5(4): 206.
41. Eze RI, Obeagu EI, Edet FN (2021) Frequency of Rh Antigen C and c among pregnant women in Sub-Urban area in Eastern Nigeria. *Madonna Uni J Med Health Sci* 1(1): 19-30.
42. Odo M, Ochei KC, Obeagu EI, Barinaadaa A, Eteng EU (2020) 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* 32(24): 9-18.
43. Obeagu EI, Obeagu GU (2023) 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* 10(9): 135-142.
44. Obeagu EI, Onuoha EC (2023) Tuberculosis among HIV Patients: A review of Prevalence and Associated Factors. *Int J Adv Res Biol Sci* 10(9): 128-134.
45. Obeagu EI, Ibeh NC, Nwobodo HA, Ochei KC, Iwegbulam CP (2017) Haematological indices of malaria patients coinfectd with HIV in Umuahia. *Int J Curr Res Med Sci* 3(5): 100-104.
46. Viola N, Kimono E, Nuruh N, Obeagu EI (2023) Factors Hindering Elimination of Mother to Child Transmission of HIV Service Uptake among HIV Positive Women at Comboni Hospital Kyamuhunga Bushenyi District. *Asian Journal of Dental and Health Sciences* 3(2): 7-14.
47. Okorie HM, Obeagu EI, Okpoli HCH, Chukwu SN (2020) 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* 2(3): 180-183.
48. Ezugwu UM, Onyenekwe CC, Ukibe NR, Ahaneku JE, Obeagu EI, et al. (2021) 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* 33(47A): 78-84.
49. Emmanuel G, Martin O, Peter OS, Obeagu EI, Daniel K (2023) 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* 6(1): 203-211.
50. Igwe MC, Obeagu EI, Ogbuabor AO, Eze GC, Ikpenwa JN, et al. (2022) Socio-Demographic Variables of People Living with HIV/AIDS Initiated on ART in 2014 at Tertiary Health Institution in Enugu State. *Asian Journal of Research in Infectious Diseases* 10(4): 1-7.
51. Vincent CC, Obeagu EI, Agu IS, Ukeagu NC, Onyekachi CAC (2021) Adherence to Antiretroviral Therapy among HIV/AIDS in Federal Medical Centre, Owerri. *J Pharma Res Int* 33(57A): 360-368.
52. Igwe MC, Obeagu EI, Ogbuabor AO (2022) Analysis of the Factors and Predictors of Adherence to Healthcare of People Living With Hiv/Aids in Tertiary Health Institutions in Enugu State. *Madonna University journal of Medicine and Health Sciences* 2(3): 42-57.
53. Madekwe CC, Madekwe CC, Obeagu EI (2022) Inequality

- of monitoring in Human Immunodeficiency Virus, Tuberculosis and Malaria: A Review. *Madonna University journal of Medicine and Health Sciences* 3(3): 6-15.
54. Echendu GE, Vincent CC, Ibebuikie J, Asodike M, Naze N, et al. (2023) 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* 10(8): 564-568.
 55. Nwosu DC, Nwanjo HU, Okolie NJ, Ikek K, Obeagu EI, et al. (2015) Biochemical Alterations In Adult Hiv Patients On Antiretroviral Therapy. *World Journal of Pharmacy and Pharmaceutical Sciences* 4(3): 153-160.
 56. Obeagu EI, Obeagu GU (2015) Effect of CD4 Counts on Coagulation Parameters among HIV Positive Patients in Federal Medical Centre Owerri Nigeria. *Int J Curr Res Biosci Plant Biol* 2(4): 45-49.
 57. Obeagu EI, Nwosu DC (2019) Adverse drug reactions in HIV/AIDS patients on highly active antiretroviral therapy: a review of prevalence. *Int J Curr Res Chem Pharm Sci* 6(12): 45-48.
 58. Obeagu EI, Scott GY, Amekpor F, Obeagu GU (2023) Implications of CD4/CD8 ratios in Human Immunodeficiency Virus infections. *Int J Curr Res Med Sci* 9(2): 6-13.
 59. Obeagu EI, Ochei KC, Okeke EI, Anode A (2016) Assessment of the level of haemoglobin and erythropoietin in persons living with HIV in Umuahia. *Int J Curr Res Med Sci* 2(4): 29-33.
 60. Ifeanyi OE, Obeagu GU (2015) The Values of CD4 Count among HIV Positive Patients in FMC Owerri. *Int J Curr Microbiol App Sci* 4(4): 906-910.
 61. Obeagu EI, Okeke EI, Anonde Andrew C (2016) Evaluation of Haemoglobin and Iron Profile Study Among Persons Living With HIV in Umuahia Abia State Nigeria. *Int J Curr Res Biol Med* 1(2): 1-5.
 62. Alum EU, Ugwu OP, Obeagu EI, Okon MB (2023) Curtailing HIV/AIDS Spread Impact of Religious Leaders. *Newport International Journal of Research in Medical Sciences* 3(2): 28-31.
 63. Obeagu EI, Obeagu GU, Paul-Chima UO (2023) Stigma Associated With HIV AIDS A Review. *Newport International Journal of Public Health and Pharmacy* 3(2): 64-67.
 64. Alum EU, Obeagu EI, Ugwu OP, Aja PM, Okon MB (2023) HIV Infection and Cardiovascular diseases The obnoxious Duos. *Newport International Journal of Research in Medical Sciences* 3(2): 95-99.
 65. Ibebuikie JE, Nwokike GI, Nwosu DC, Obeagu EI (2018) 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* 1(2): 08-14.
 66. Obeagu EI, Obarezi TN, Omeh YN, Okoro NK, Eze OB (2014) Assessment of some haematological and biochemical parameters in HIV patients before receiving treatment in Aba Abia State Nigeria. *Res J Pharma Biol Chem Sci* 5: 825-830.
 67. Obeagu EI, Obarezi TN, Ogbuabor BN, Anaebo QB, Eze GC (2014) 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* 391: 186-189.
 68. Obeagu EI (2023) A Review of Challenges and Coping Strategies Faced by HIV/AIDS Discordant Couples. *Madonna University journal of Medicine and Health Sciences* 3(1): 7-12.
 69. Oloro OH, Obeagu EI (2022) A Systematic Review on Some Coagulation Profile in HIV Infection. *International Journal of Innovative and Applied Research* 10(5): 1-11.
 70. Nwosu DC, Obeagu EI, Nkwuocha BC, Nwanjo CA, Nwanjo HU, et al. (2015) Alterations in superoxide dismutase, vitamins C and E in HIV infected children in Umuahia, Abia state. *International Journal of Advanced Research in Biological Sciences* 2(11): 268-271.
 71. Obeagu EI, Malot S, Obeagu GU, Ugwu OP (2023) HIV resistance in patients with Sickle Cell Anaemia. *Newport International Journal of Scientific and Experimental Sciences* 3(2): 56-59.
 72. Ifeanyi OE, Uzoma OG, Stella EI, Chinedum OK, Abum SC (2018) Vitamin D and insulin resistance in HIV sero positive individuals in Umudike. *Int J Curr Res Med Sci* 4(2): 104-108.
 73. Ifeanyi OE, Leticia OI, Nwosu D, Chinedum OK (2018) A Review on blood borne viral infections: universal precautions. *Int J Adv Res Biol Sci* 5(6): 60-66.
 74. Nwovu AI, Ifeanyi OE, Uzoma OG, Nwebonyi NS (2018) 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 1(2): 508.
75. Chinedu K, Takim AE, Obeagu EI, Chinazor UD, Eloghosa O, et al. (2017) HIV and TB co-infection among patients who used Directly Observed Treatment Short-course centres in Yenagoa, Nigeria. IOSR J Pharm Biol Sci 12(4): 70-75.
 76. Baines KJ, West RC (2023) Sex differences in innate and adaptive immunity impact fetal, placental, and maternal health. Biology of reproduction 109(3): 256-270.
 77. Offie DC, Obeagu EI, Akueshi C, Njab JE, Ekanem EE, et al. (2021) Facilitators and barriers to retention in HIV care among HIV infected MSM attending Community Health Center Yaba, Lagos Nigeria. Journal of Pharmaceutical Research International 33(52B): 10-19.
 78. Obeagu EI, Obeagu GU, Ede MO, Odo EO, Buhari HA (2023) Translation of HIV/AIDS knowledge into behavior change among secondary school adolescents in Uganda: A review. Medicine Baltimore 102(49): e36599.
 79. Obeagu EI, Ofodile AC, Okwuanaso CB (2023) A review of urinary tract infections in pregnant women: Risks factors. J Pub Health Nutri 6(1): 137.
 80. Obeagu EI, Obeagu GU, Musiimenta E (2023) Postpartum haemorrhage among pregnant women: Update on risks factors. Int J Curr Res Med Sci 9(2): 14-17.
 81. Obeagu EI, Obeagu GU, Ogunnaya FU (2023) Deep vein thrombosis in pregnancy: A review of prevalence and risk factors. Int J Curr Res Chem Pharm Sci 10(8): 14-21.
 82. Jakheng SP, Obeagu EI, Jakheng EW, Uwakwe OS, Eze GC, et al. (2022) Occurrence of Chlamydial Infection Based on Clinical Symptoms and Clinical History among Pregnant Women Attending Clinics in Zaria Metropolis, Kaduna State, Nigeria. International Journal of Research and Reports in Gynaecology 5(3): 98-105.
 83. Okorie HM, Obeagu EI, Eze EN, Jeremiah ZA (2018) Assessment of some haematological parameters in malaria infected pregnant women in Imo state Nigeria. Int J Curr Res Biol Med 3(9): 1-4.
 84. Anyiam AF, Arinze AOC, Irondi EA, Obeagu EI (2023) Distribution of ABO and rhesus blood grouping with HIV infection among blood donors in Ekiti State Nigeria. Medicine Baltimore 102(47): e36342.
 85. Echefu SN, Udosen JE, Akwiwu EC, Akpotuzor JO, Obeagu EI (2023) 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 102(47): e35910.
 86. Opeyemi AA, Obeagu EI (2023) Regulations of malaria in children with human immunodeficiency virus infection: A review. Medicine Baltimore 102(46): e36166.
 87. Alum EU, Obeagu EI, Ugwu OPC, Samson AO, Adepoju AO, et al. (2023) Inclusion of nutritional counseling and mental health services in HIV/AIDS management: A paradigm shift. Medicine Baltimore 102(41): e35673.
 88. Aizaz M, Abbas FA, Abbas A, Tabassum S, Obeagu EI (2023) Alarming rise in HIV cases in Pakistan: Challenges and future recommendations at hand. Health Sci Rep 6(8): e1450.
 89. Obeagu EI, Obeagu GU, Obiezu J, Ezeonwumelu C, Ogunnaya FU, et al. (2023) Hematologic Support in HIV Patients: Blood Transfusion Strategies and Immunological Considerations. App Sci 3(3): 9-15.
 90. Obeagu EI, Ubosi NI, Uzoma G (2023) Storms and Struggles: Managing HIV Amid Natural Disasters. Int J Curr Res Chem Pharm Sci 10(11): 14-25.
 91. Obeagu EI, Obeagu GU (2023) Human Immunodeficiency Virus and tuberculosis infection: A review of prevalence of associated factors. Int J Adv Multidiscip Res 10(10): 56-62.
 92. Obeagu EI, Malot S, Obeagu GU, Ugwu OP (2023) HIV resistance in patients with Sickle Cell Anaemia. Newport International Journal of Scientific and Experimental Sciences 3(2): 56-59.
 93. Alum EU, Ugwu OP, Obeagu EI, Aja PM, Okon MB, et al. (2023) Reducing HIV Infection Rate in Women: A Catalyst to reducing HIV Infection pervasiveness in Africa. International Journal of Innovative and App Res 11(10): 01-06.
 94. Jackson DJ, Akuthota P, Roufousse F (2022) Eosinophils and eosinophilic immune dysfunction in health and disease. European Respiratory Review 31(163): 210150.
 95. Ramirez GA, Yacoub MR, Ripa M, Mannina D, Cariddi A, et al. (2018) Eosinophils from physiology to disease: a comprehensive review. BioMed Res Int 2018: 9095275.
 96. Okoroiwu IL, Chinedu MJU, Obeagu EI, Vincent CC, Ochiabuto OM, et al. (2021) Evaluation of Iron Status, Haemoglobin and Protein Levels of Pregnant Women in Owerri Metropolis. J Pharm Res Int 33(27A): 36-43.
 97. Obeagu EI, Njar VE, Obeagu GU (2023) Infertility: Prevalence and Consequences. Int J Cur Res Chem Pharm Sci 10(7): 43-50.
 98. Emeka OOR, Ibeh NC, Obeagu EI, Okorie HM (2021)

Evaluation of levels of some inflammatory cytokines in preeclamptic women in owerri. *Journal of Pharmaceutical Research International* 33(42A): 53-65.

99. Obeagu EI, Faduma MH, Uzoma G (2023) Ectopic Pregnancy: A Review. *Int J Curr Res Chem Pharm Sci* 10(4): 40-44.
100. Obeagu EI, Gamade SM, Obeagu GU (2023) The roles of Neutrophils in pregnancy. *Int J Curr Res Med Sci* 9(5): 31-35.
101. Eze R, Obeagu EI, Nwakulite A, Okoroiwu IL, Vincent

CC, et al. (2021) Evaluation of Copper Status and Some Red Cell Parameters of Pregnant Women in Enugu State, South Eastern Nigeria. *Journal of Pharmaceutical Research International* 33(30A): 67-71.

102. Obeagu EI, Obeagu GU (2023) Molar Pregnancy: Update of prevalence and risk factors. *Int J Curr Res Med Sci* 9(7): 25-28.
103. Obeagu EI, Bunu UO (2023) Factors that influence unmet need for family planning. *International Journal of Current Research in Biology and Medicine* 8(1): 23-27.

