



Diabetes and Comorbidities: The Intersection of Diabetes with HIV/AIDS and Hypertension in African Populations

Alberta Jeanne N.

School of Applied Health Sciences Kampala International University Uganda

ABSTRACT

Diabetes mellitus, HIV/AIDS, and hypertension are critical health challenges in African populations, with rising prevalence due to urbanization, lifestyle changes, and genetic factors. This review explores the intersection of these conditions, highlighting epidemiological trends, pathophysiological mechanisms, and clinical management challenges. Individuals with HIV/AIDS face increased diabetes risk due to chronic inflammation and antiretroviral therapy (ART) effects, while the coexistence of hypertension and diabetes exacerbates cardiovascular risks. Effective management is complicated by limited healthcare resources, geographic barriers, social determinants, and the need for integrated care models. Strategies such as strengthening healthcare infrastructure, community-based interventions, task-shifting, policy advocacy, and research are essential for improving health outcomes. A comprehensive literature review of epidemiological data, clinical studies, and existing healthcare strategies was utilized to provide a detailed analysis of the intersection of diabetes with HIV/AIDS and hypertension in African populations.

Keywords: Multi-morbidity, Antiretroviral Therapy (ART), Integrated Care Models, Chronic Disease Management, Health Infrastructure in Africa

INTRODUCTION

Diabetes mellitus, HIV/AIDS, and hypertension are three of the most pressing health challenges facing African populations today [1,2,3]. The prevalence of diabetes is on the rise, driven by rapid urbanization, changes in diet and lifestyle, and genetic factors [4,5]. Simultaneously, sub-Saharan Africa remains the global epicenter of the HIV/AIDS epidemic, with millions living with the virus despite significant advances in treatment [6,7]. Hypertension, often dubbed the "silent killer," affects a substantial portion of the adult population, further compounding the region's health burden. The intersection of these three conditions creates a complex and multifaceted public health issue. Individuals living with HIV/AIDS are at increased risk for developing diabetes due to the effects of chronic inflammation and the side effects of antiretroviral therapy (ART) [8,9,10]. Similarly, the coexistence of hypertension and diabetes exacerbates cardiovascular risks, making management more challenging and costly. The presence of multiple chronic conditions in a single patient, known as multimorbidity, complicates treatment protocols and requires a comprehensive, integrated approach to care. Managing these comorbidities in Africa is particularly challenging due to the region's limited healthcare resources [11,12]. In many areas, healthcare systems are underfunded and understaffed, with significant barriers to accessing care. Geographic isolation, lack of infrastructure, and economic constraints further hinder the effective management of chronic diseases. Additionally, social determinants such as stigma, health literacy, and cultural beliefs play a significant role in shaping health outcomes and the effectiveness of interventions [13,14,15]. This review aims to explore the intersection of diabetes with HIV/AIDS and hypertension in African populations, highlighting the epidemiological trends, pathophysiological mechanisms, and clinical management challenges. It will also examine innovative strategies and integrated care models that have been developed to address these complex health issues.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

By understanding the unique challenges and opportunities in managing diabetes and its comorbidities in Africa, we can better inform policies, improve healthcare delivery, and ultimately enhance patient outcomes.

EPIDEMIOLOGY

Diabetes

The prevalence of diabetes in Africa has been rising steadily, driven by urbanization, lifestyle changes, and genetic factors. The International Diabetes Federation estimates that approximately 19 million adults aged 20-79 years were living with diabetes in the Africa region in 2019, with projections suggesting a significant increase in the coming decades [16,17].

HIV/AIDS

Sub-Saharan Africa remains the epicenter of the global HIV epidemic, with approximately 70% of the world's HIV-positive population residing in the region. Advances in antiretroviral therapy (ART) have significantly improved the life expectancy of individuals with HIV, leading to an increase in the prevalence of chronic conditions, including diabetes, among this population [18,19,20].

Hypertension

Hypertension is another major public health issue in Africa, affecting an estimated 46% of adults aged 25 years and older. The high prevalence of hypertension, combined with the rising incidence of diabetes, poses significant risks for cardiovascular diseases and other complications [21,22].

PATHOPHYSIOLOGY

Diabetes and HIV/AIDS

The relationship between diabetes and HIV/AIDS is multifaceted. HIV infection and ART can both influence glucose metabolism. Certain ART regimens are associated with insulin resistance and hyperglycemia, increasing the risk of developing diabetes. Additionally, chronic inflammation and immune activation seen in HIV-infected individuals can contribute to metabolic disturbances [23,24].

Diabetes and Hypertension

Diabetes and hypertension frequently coexist, and their interaction exacerbates the risk of cardiovascular complications. Insulin resistance and hyperglycemia contribute to endothelial dysfunction and arterial stiffness, promoting hypertension. Conversely, hypertension can worsen glucose metabolism, creating a vicious cycle that complicates disease management [21].

HIV/AIDS and Hypertension

Individuals with HIV/AIDS are at increased risk for hypertension due to factors such as chronic inflammation, ART-related metabolic effects, and lifestyle factors. The coexistence of hypertension with HIV/AIDS further complicates the clinical management of these patients, necessitating a comprehensive approach to care [19].

CLINICAL MANAGEMENT CHALLENGES

Integrated Care Models

Managing diabetes, HIV/AIDS, and hypertension in African populations requires integrated care models that address the unique needs of patients with multiple comorbidities. These models should focus on coordinated care delivery, patient education, and regular monitoring of disease markers [25].

Resource Constraints

Healthcare systems in many African countries face significant resource constraints, including limited access to medications, diagnostic tools, and trained healthcare professionals. These limitations hinder the effective management of diabetes and its comorbidities, leading to suboptimal treatment outcomes [26].

Patient Adherence

Adherence to treatment regimens is a critical challenge in managing chronic diseases. Factors such as medication side effects, complex treatment schedules, and financial barriers can affect patient adherence, complicating disease management and increasing the risk of complications.

Stigma and Health Literacy

The stigma associated with HIV/AIDS and low health literacy levels can further impede effective disease management. Patients may be reluctant to seek care or disclose their health conditions, leading to delays in diagnosis and treatment.

STRATEGIES FOR INTEGRATED CARE

Strengthening Healthcare Infrastructure

Investing in healthcare infrastructure is essential for improving the management of diabetes and its comorbidities. This includes enhancing access to diagnostic tools, medications, and training for healthcare professionals.

Community-Based Interventions

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Community-based interventions, such as the use of community health workers and peer support groups, can improve disease awareness, patient education, and treatment adherence. These interventions are particularly valuable in resource-limited settings where healthcare access is challenging [27].

Task-Shifting

Task-shifting, which involves delegating specific tasks to less specialized healthcare workers, can help address workforce shortages and improve care delivery. For example, training nurses and community health workers to manage chronic diseases can enhance the capacity of healthcare systems to provide integrated care [28].

Policy and Advocacy

Advocacy for policies that support integrated care and reduce the financial burden of chronic disease management is crucial. This includes efforts to make essential medications and diagnostic tools more affordable and accessible [29].

Research and Data Collection

Ongoing research and data collection are needed to better understand the epidemiology of diabetes and its comorbidities in African populations. This information is vital for developing targeted interventions and assessing the effectiveness of integrated care models [30].

CONCLUSION

The intersection of diabetes with HIV/AIDS and hypertension presents significant challenges for African populations and healthcare systems. Effective management of these comorbidities requires integrated care models, investment in healthcare infrastructure, and community-based interventions. By addressing the unique needs of patients with multiple chronic conditions and leveraging innovative strategies, it is possible to improve health outcomes and reduce the burden of these diseases in Africa. Continued research, policy support, and advocacy are essential for advancing the management of diabetes and its comorbidities in the region.

REFERENCES

1. Alum EU, Ugwu OPC, Obeagu EI, Aja PM, Ugwu CN, Okon MB. Nutritional Care in Diabetes Mellitus: A Comprehensive Guide. *International Journal of Innovative and Applied Research*. 2023; 11(12):16-25. Article DOI: 10.58538/IJAR/2057
2. Ugwu OPC, Alum EU and Uhama KC. (2024). Dual Burden of Diabetes Mellitus and Malaria: Exploring the Role of Phytochemicals and Vitamins in Disease Management. *Research Invention Journal of Research in Medical Sciences*. 3(2):38-49.
3. Ezeani NN, Edwin N, Alum EU, Orji OU, Ugwu OPC. Effect of Ethanol Leaf Extract of *Ocimum gratissimum* (Scent Leaf) on Lipid Profile of Alloxan-Induced Diabetic Rats. *International Digital Organization for Scientific Research Journal of Experimental Sciences*, 2017; 2 (1): 164-179. www.idosr.org. <https://www.idosr.org/wp-content/uploads/2017/07/IDOSR-JES-21-164-179-2017-ezeani-2-updated.pdf>
4. Ugwu OPC, Alum EU, Obeagu EI, Okon MB, Aja PM, Samson AO, Amusa MO, Adepoju AO. Effect of Ethanol leaf extract of *Chromolaena odorata* on lipid profile of streptozotocin-induced diabetic wistar albino rats. *IAA Journal of Biological Sciences*. 2023; 10(1):109-117.
5. Egwu CO, Offor CE, Alum EU. Anti-diabetic effects of *Buchholzia coriacea* ethanol seed Extract and Vildagliptin on Alloxan-induced diabetic albino Rats. *International Journal of Biology, Pharmacy and Allied Sciences (IJBPAS)*. 2017; 6 (6): 1304-1314. www.ijbpas.com. <https://ijbpas.com/pdf/2017/June/1497506120MS%20IJBPAS%202017%204202.pdf>
6. Alum EU, Uti DE, Ugwu OP, Alum BN. Toward a cure - Advancing HIV/AIDS treatment modalities beyond antiretroviral therapy: A Review. *Medicine (Baltimore)*. 2024 Jul 5;103(27):e38768. doi: 10.1097/MD.00000000000038768. PMID: 38968496.
7. Alum EU, Obeagu EI, Ugwu OPC, Egba SI, Ejim Uti DE, Ukaidi CUA, Echegu DA. Confronting Dual Challenges: Substance Abuse and HIV/AIDS. *Elite Journal of HIV*, 2024; 2(5): 1-8. <https://epjournals.com/journals/EJHIV>
8. Obeagu EI, Alum E.U., and Obeagu, G.U. Factors Associated with Prevalence of HIV Among Youths: A Review of Africa Perspective. *Madonna University Journal of Medicine and Health Sciences*, 2023; 3(1): 13-18. <https://madonnauniversity.edu.ng/journals/index.php/medicine>.
9. Uti DE, Igile GO, Omang WA, Umoru GU, Udeozor PA, Obeten UN, Ogbonna ON, Ibiam UA, Alum EU, Ohunene OR, Chukwufumnanya MJ, Oplekwu RI, Obio WA. Anti-Diabetic Potentials of Vernonioid E Saponin; A Biochemical Study. *Natural Volatiles and Essential Oils*. 2021; 8(4): 14234-14254.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

10. Alum EU, Ugwu OPC, Obeagu EI and Okon MB Curtailing HIV/AIDS Spread: Impact of Religious Leaders. *Newport International Journal of Research in Medical Sciences (NIJRMS)*, 2023; 3(2): 28-31. <https://nijournals.org/wp-content/uploads/2023/06/NIJRMS-32-28-31-2023-rm.pdf>.
11. Offor CE, Anyanwu E, Alum EU and Egwu C. Effect of Ethanol Leaf-Extract of *Ocimum basilicum* on Plasma Cholesterol Level of Albino Rats. *International Journal of Pharmacy and Medical Sciences*, 2013; 3 (2): 11-13. DOI: 10.5829/idosi.ijpms.2013.3.2.1101.
12. Aja PM, Chiadikaobi CD, Agu PC, Ale BA, Ani OG, Ekpono EU, Ogwoni HA, Awoke JN, Ogbu PN, Aja L, Nwite FE, Ukachi OU, Orji OU, Nweke PC, Egwu CO, Ekpono EU, Ewa GO, Igwenyi IO, Tusubira D, Offor CE, Maduagwuna EK, Alum EU, Uti DE, Njoku A, Atoki VA, Awuchi CG. *Cucumeropsis mannii* seed oil ameliorates Bisphenol-A-induced adipokines dysfunctions and dyslipidemia. *Food Sci Nutr*. 2023 Feb 18;11(6):2642-2653. doi: 10.1002/fsn3.3271. PMID: 37324904; PMCID: PMC10261814.
13. Obeagu EI, Obeagu GU, Alum EU. and Ugwu OPC. Advancements in Immune Augmentation Strategies for HIV Patients. *IAA Journal of Biological Sciences*. 2023; 11(1):1-11. <https://doi.org/10.59298/IAAJB/2023/1.2.23310>
14. Alum EU, Obeagu EI, Ugwu OPC, Samson AO, Adepoju AO, Amusa MO. Inclusion of nutritional counseling and mental health services in HIV/AIDS management: A paradigm shift. *Medicine (Baltimore)*. 2023;102(41):e35673. <http://dx.doi.org/10.1097/MD.00000000000035673>. PMID: 37832059; PMCID: PMC10578718.
15. Obeagu EI, Obeagu GU, Odo EO, Igwe MC, Ugwu OPC, Alum EU. and Okwaja PR. Disaster Fallout: Impact of Natural Calamities on HIV Control. *IAA Journal of Applied Sciences*. 2024; 11(1):13-21. <https://doi.org/10.59298/IAAJAS/2024/2.5.9243>.
16. El-Kebbi IM, Bidikian NH, Hneiny L, Nasrallah MP. Epidemiology of type 2 diabetes in the Middle East and North Africa: Challenges and call for action. *World J Diabetes*. 2021;12(9):1401-1425. doi: 10.4239/wjd.v12.i9.1401.
17. Assah F, Mbanya JC. (2017). Diabetes in Sub-Saharan Africa. In: Dagogo-Jack, S. (eds) *Diabetes Mellitus in Developing Countries and Underserved Communities*. Springer, Cham. https://doi.org/10.1007/978-3-319-41559-8_3
18. Alum EU, Obeagu EI, Ugwu OPC, Aja PM, Okon MB. HIV Infection and Cardiovascular diseases: The obnoxious Duos. *Newport International Journal of Research in Medical Sciences (NIJRMS)*, 2023; 3(2): 95-99. <https://nijournals.org/wp-content/uploads/2023/07/NIJRMS-3-295-99-2023.pdf>.
19. Obeagu EI, Obeagu GU, Alum EU, Ugwu OPC. Comprehensive Review of Antiretroviral Therapy Effects on Red Blood Cells in HIV Patients. *INOSR Experimental Sciences*. 2023; 12(3):63-72. <https://doi.org/10.59298/INOSRES/2023/6.3.21322>.
20. Alum EU, Ugwu OPC, Obeagu EI, Aja PM, Okon MB, Uti DE. Reducing HIV Infection Rate in Women: A Catalyst to reducing HIV Infection pervasiveness in Africa. *International Journal of Innovative and Applied Research*. 2023; 11(10):01-06. DOI: 10.58538/IJIAR/2048. <http://dx.doi.org/10.58538/IJIAR/2048>.
21. Aja PM, Nwuguru ME, Okorie UC, Alum EU, Offor CE. Effect of Decoction Extract of *Whitfieldia lateritia* on Lipid Profiles in Hypercholesterolemic Albino Rats. *Global Veterinaria*, 2015; 14(3): 448-452. DOI: 10.5829/idosi.gv.2015.14.03.93130.
22. Uti, D. E., Ibiam U. A., Omang, W. A., Udeozor, P. A., Umoru, G. U., Nwadam, S. K., Bawa, I., Alum, E. U., Mordi, J. C., Okoro, E. O., Obeten, U. N., Onwe, E. N., Zakari, S., Opotu, O. R., Aja, P. M. Buchholzia coriacea Leaves Attenuated Dyslipidemia and Oxidative Stress in Hyperlipidemic Rats and Its Potential Targets In Silico. *Pharmaceutical Fronts*. 2023; 05(03): e141-e152. DOI: 10.1055/s-0043-1772607.
23. Minja NW, Nakagaayi D, Aliku T, Zhang W, Ssinabulya I, Nabaale J, Amutuhaire W, de Loizaga SR, Ndagire E, Rwebembera J, Okello E, Kayima J. Cardiovascular diseases in Africa in the twenty-first century: Gaps and priorities going forward. *Front Cardiovasc Med*. 2022; 9:1008335. doi: 10.3389/fcvm.2022.1008335.
24. Mohan, Viswanathan, Seedat, Yackoob K., Pradeepa, Rajendra, The Rising Burden of Diabetes and Hypertension in Southeast Asian and African Regions: Need for Effective Strategies for Prevention and Control in Primary Health Care Settings, *International Journal of Hypertension*, 2013, 409083, 14 pages, 2013. <https://doi.org/10.1155/2013/409083>
25. Obeagu EI, Obeagu GU, Alum EU, Ugwu OPC. Understanding the Impact of HIV-Associated Bone Marrow Alterations on Erythropoiesis. *INOSR Scientific Research*. 2023; 10(1):1-11. <https://doi.org/10.59298/INOSRSR/2023/1.2.12222>

26. Oleribe OO, Momoh J, Uzochukwu BS, Mbofana F, Adebisi A, Barbera T, Williams R, Taylor-Robinson SD. Identifying Key Challenges Facing Healthcare Systems In Africa And Potential Solutions. *Int J Gen Med.* 2019; 12:395-403. doi: 10.2147/IJGM.S223882.
27. Obeagu EI, Obeagu GU, Alum EU, Ugwu OPC. Advancements in Immune Augmentation Strategies for HIV Patients. *IAA Journal of Biological Sciences.* 2023; 11(1):1-11. <https://doi.org/10.59298/IAAJB/2023/1.2.23310>
28. Leong SL, Teoh SL, Fun WH, Lee SWH. Task shifting in primary care to tackle healthcare worker shortages: An umbrella review. *Eur J Gen Pract.* 2021; 27(1):198-210. doi: 10.1080/13814788.2021.1954616.
29. Schmidt H. Chronic Disease Prevention and Health Promotion. 2016 Apr 13. In: H. Barrett D, W. Ortmann L, Dawson A, et al., editors. *Public Health Ethics: Cases Spanning the Globe* [Internet]. Cham (CH): Springer; 2016. Chapter 5. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK435779/> doi: 10.1007/978-3-319-23847-0_5
30. Mercer T, Chang AC, Fischer L, Gardner A, Kerubo I, Tran DN, Laktabai J, Pastakia S. Mitigating The Burden Of Diabetes In Sub-Saharan Africa Through An Integrated Diagonal Health Systems Approach. *Diabetes Metab Syndr Obes.* 2019 Oct 31;12:2261-2272. doi: 10.2147/DMSO.S207427.

CITATION: Alberta Jeanne N. Diabetes and Comorbidities: The Intersection of Diabetes with HIV/AIDS and Hypertension in African Populations. Research Output Journal of Biological and Applied Science, 2024 3(3)54-58.