



World AIDS Day: a short look at HIV-associated nephropathy

Sadaf Farnam Nia¹, Hamid Nasri¹, Simin Mazaheri Tehrani², Shiva Rouzbahani^{3*}

Abstract

December 1 marks World AIDS Day, a global effort to increase awareness and knowledge about HIV/AIDS. HIV/AIDS can cause various renal complications, including acute renal failure, HIV-associated nephropathy, comorbid chronic renal failure, thrombotic microangiopathy in some cases, and treatment-associated nephrotoxicity. HIV infection of kidney epithelial cells can also affect the glomerular filtration rate through glomerular and tubular injury, developing proteinuria, and direct viral infection. Collapsing glomerulopathy is the most characteristic lesion observed in AIDS-associated nephropathy, presenting as segmental or global collapse of glomerular tufts across with hypertrophy and hyperplasia of podocytes. This glomerulopathy is a variant of focal segmental glomerulosclerosis detected by mesangial hyperplasia and associated with mesangial matrix expansion and cellularity. As a result of this disease, the tubulointerstitial changes involve the infiltration of lymphocytes, plasma cells, and macrophages in the interstitial region. As the disease progresses, tubular atrophy and fibrosis become more severe. This study delves into the historical background of AIDS-associated nephropathy, emphasizing its importance in the fight against HIV/AIDS.

Keywords: World AIDS Day, Glomerulosclerosis, Tubulointerstitial inflammation, collapsing glomerulopathy, Focal segmental glomerulosclerosis, AIDS-associated nephropathy, HIV-related kidney diseases

Citation: Farnam Nia S, Nasri H, Mazaheri Tehrani S, Rouzbahani S. World AIDS Day: a short look at HIV-associated nephropathy. J Ren Endocrinol. 2024;10:e25136. doi: 10.34172/jre.2024.25136.

Copyright © 2024 The Author(s); Published by Nickan Research Institute. 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.

Introduction

World AIDS Day is an annual observance held on December 1st to increase alertness concerning HIV/AIDS and explain international unity in the face of this infection and its complications. This event is an occasion for physicians and patients to enhance their knowledge of the treatment and prevention of HIV/AIDS worldwide (1). The primary goal of World AIDS Day is to unite people globally to help end HIV and remember those lost to AIDS-related illnesses (2). Studies have shown that when HIV infects renal epithelial cells, it can cause significant structural changes in the kidney. These alterations include the accumulation of HIV viral particles, expression of HIV-1 genes, and persistent activation of nuclear factor kappa-light-chain-enhancer of activated B cells (NF- κ B), which can result in damage to both glomerular and tubular regions of the kidney. As a result, HIV-associated kidney diseases may develop, leading to renal dysfunction (3).

Renal pathology findings of AIDS-associated nephropathy, also known as HIV-associated nephropathy (HIVAN).

Kidney biopsy of patients with HIVAN often reveals collapsing focal segmental glomerulosclerosis, characterized by the collapse and obliteration of glomerular capillaries accompanied by mesangial hyperplasia. This finding is a hallmark of this glomerulopathy (4,5). In addition, kidney biopsy may reveal microcystic dilatation of the tubules, which results from the direct cytopathic effect of the HIV-1 virus actively replicating inside the renal cells (5). Inflammation in the interstitial space of the kidney is commonly observed in HIVAN. Tubulointerstitial changes consist of interstitial inflammation, tubular atrophy, and fibrosis. Moreover, podocytes may show proliferation following this disease (6,7).

New methods, such as in situ hybridization and polymerase chain reaction assays, have revealed that HIV-1 can infect the cells of renal glomerular and tubular epithelium. This discovery strongly suggests the existence of a reservoir of the virus in the kidney cells due to localized replication of HIV-1 (8,9).

Conclusion

World AIDS Day has become one of the most broadly

Received: 28 September 2023, Accepted: 1 January 2024, ePublished: 29 January 2024

¹Nickan Research Institute, Isfahan, Iran. ²Department of Molecular Biotechnology and Health Sciences, School of Medicine, University of Turin, Turin, Italy. ³Bascom Palmer Eye Institute, Miller School of Medicine, University of Miami, Miami, FL, USA.

*Corresponding Author: Shiva Rouzbahani M.D, Email: sxr3795@miami.edu, shiva.rouzbahani@gmail.com

■ Implication for health policy/practice/research/medical education

HIV-associated renal disease manifests with four morphologic lesions, which include glomerular-dominant nephropathy, acute tubular necrosis, interstitial nephritis, and vascular disease. Following infection of renal epithelial cells by HIV, cellular damage and dysfunction will ensue. The localized replication of HIV-1 in the kidney, along with direct contact between HIV-1 infected macrophages and renal tubule epithelial cells, contributes to the pathogenesis of HIV-associated nephropathy.

known international health days and is a strategic occasion to increase awareness of prevention and treatment. We should remember that AIDS-associated nephropathy is a progressive kidney disease considered as glomerulosclerosis along with tubulointerstitial nephritis. The pathogenesis of this disease includes a complex interplay amongst viral parameters, immune system disorders, and host genetic liability.

Authors' contribution

Conceptualization: Sadaf Farnam Nia, Hamid Nasri.
Data curation: Sadaf Farnam Nia, Hamid Nasri.
Funding acquisition: Sadaf Farnam Nia, Hamid Nasri.
Investigation: Sadaf Farnam Nia, Hamid Nasri.
Resources: Sadaf Farnam Nia, Hamid Nasri.
Supervision: Sadaf Farnam Nia, Hamid Nasri.
Validation: Sadaf Farnam Nia, Hamid Nasri.
Visualization: Sadaf Farnam Nia, Hamid Nasri.
Writing—original draft: Sadaf Farnam Nia, Hamid Nasri.
Writing—review & editing: Sadaf Farnam Nia, Hamid Nasri, Simin Mazaheri Tehrani Shiva Rouzbahani.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

Funding/Support

None.

References

1. Valadez G. World AIDs Day: A Case Study of How One Hispanic-Serving Institution's Inclusive Practices Supported Lesbian, Gay, Bisexual, and Transgender Students. In: Hispanic-Serving Institutions in American Higher Education. New York: Routledge; 2015. p. 154-177
2. Piot P, Abdool Karim SS, Hecht R, Legido-Quigley H, Buse K, Stover J, et al; UNAIDS–Lancet Commission. Defeating AIDS—advancing global health. *Lancet*. 2015;386:171-218. doi: 10.1016/S0140-6736(15)60658-4.
3. Hughes K, Akturk G, Gnjatc S, Chen B, Klotman M, Blasi M. Proliferation of HIV-infected renal epithelial cells following virus acquisition from infected macrophages. *AIDS*. 2020;34:1581-1591. doi: 10.1097/QAD.0000000000002589.
4. Melendez Rivera JG, Hashmi MF. HIV Nephropathy. [Updated 2023 Jun 5]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK559134/>
5. Wyatt CM, Klotman PE, D'Agati VD. HIV-associated nephropathy: clinical presentation, pathology, and epidemiology in the era of antiretroviral therapy. *Semin Nephrol*. 2008;28:513-22. doi: 10.1016/j.semnephrol.2008.08.005.
6. Rivera FB, Ansay MFM, Golbin JM, Alfonso PGI, Mangubat GFE, Menghrajani RHS, et al. HIV-Associated Nephropathy in 2022. *Glomerular Dis*. 2022;3:1-11. doi: 10.1159/000526868.
7. Swanepoel CR, Atta MG, D'Agati VD, Estrella MM, Fogo AB, Naicker S, et al; Conference Participants. Kidney disease in the setting of HIV infection: conclusions from a Kidney Disease: Improving Global Outcomes (KDIGO) Controversies Conference. *Kidney Int*. 2018;93:545-559. doi: 10.1016/j.kint.2017.11.007.
8. Tanji N, Ross MD, Tanji K, Bruggeman LA, Markowitz GS, Klotman PE, et al. Detection and localization of HIV-1 DNA in renal tissues by in situ polymerase chain reaction. *Histol Histopathol*. 2006;21:393-401. doi: 10.14670/HH-21.393.
9. Patterson BK, Till M, Otto P, Goolsby C, Furtado MR, McBride LJ, et al. Detection of HIV-1 DNA and messenger RNA in individual cells by PCR-driven in situ hybridization and flow cytometry. *Science*. 1993;260:976-9. doi: 10.1126/science.8493534.