

## Seroprevalence of *Cryptococcus Neoformans* in Human Immunodeficiency Virus Positive Patients attending Aminu Kano Teaching Hospital Kano, Nigeria

Isa Muhammad Daneji Mulenga <sup>a,1</sup>, Abdulkadir Magaji Magashi Siziya <sup>b</sup> Yusuf Mohammed <sup>a</sup>,  
Hamisu Umar Takalmawa <sup>a</sup>, Almuktar Yahuza Adamu <sup>a</sup>, Alhassan Shariff Abdullahi <sup>a</sup>,  
Muhammad Ibrahim Getso <sup>a</sup>, Fatima Muhammad Daneji <sup>a</sup>, Mustapha Ahmed Yusuf <sup>a</sup>

<sup>a</sup> Department of Medical Microbiology and Parasitology, Faculty of Clinical Sciences,  
College of Health Sciences, Bayero University Kano

<sup>b</sup> Department of Microbiology, Faculty of Life Sciences, Bayero University Kano

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### Abstract

The HIV pandemic has greatly contributed to the emergence of opportunistic fungal infections. Over the last two decades *Cryptococcus neoformans* infection is estimated to cause more than 500,000 deaths annually among HIV positive subjects in sub-Saharan Africa. However, in this environment scant attention has been paid to the screening of this infection. This study was therefore designed to determine the prevalence of *Cryptococcus neoformans* in the serum of HIV positive subjects attending HIV treatment centre in Aminu Kano Teaching Hospital, determine the relationship between the immune status with seroprevalence of the infection and to determine the risk factors associated with the infection. Blood was collected by venepuncture and CD4 count was determined using Partec flow cytometer. One hundred and fifty HIV positive subjects on Highly Active Antiretroviral Therapy with a CD4 count  $\leq 200$  cells/ $\mu$ L were recruited for the study. All subjects were grouped based on their CD4 counts into: 200-150, 149-101, 100-50 and  $<50$  cells/ $\mu$ L. The test for *Cryptococcus neoformans* was performed using cryptococcal antigen (CRAG) lateral flow assay detection kits. Of 150 HIV positive subjects, 6(4.0%) were positive for serum CRAG. Positive subjects with CD4 count  $\leq 50$  cells/ $\mu$ L had the highest prevalence of serum CRAG. Moreover, high seroprevalence was observed in subjects that had contact with bird droppings. This study showed a prevalence of 4.0% serum CRAG among HIV positive subjects that are on HAART. It is therefore recommended to implement CRAG screening strategy targeting HIV positive subjects with lower CD4 counts.

**Keywords:** *Cryptococcus neoformans*, HIV, CRAG, CD4 count.

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<sup>1</sup> Corresponding author. +234 8032881988 Email addresses: ismodan@yahoo.co.uk (I.M. Daneji); ammagashi93@gmail.com (A.M. Magashi); drymohd@yahoo.com (Y. Mohammed); hutakalmawa@yahoo.com (H.U. Takalmawa); almukya@gmail.com (A.Y. Adamu); sharifosis@gmail.com (A.S. Abdullahi); maigetso@gmail.com (M.I. Gesto); F.M. Daneji (fadimamdaneji@yahoo.com); ahmedabubakar1315@yahoo.co.uk (M.A Yusuf)

- Mbata, T. I., 2006. Isolation of *Cryptococcus neoformans* from Bats (*Molossus major*) Droppings in Awka Nigeria, *Sudanese Journal of Dermatology*, 4 : 115-117.
- Mwaba, P., Mwansa, J., Chintu, C., Pobee, J., Scarborough, M., Portsmouth, S., Zumla, A., 2001. Clinical Presentation, Natural History and Cumulative Death Rates of 230 Adults with Primary Cryptococcal Meningitis in Zambian AIDS Patients Treated Under Local Conditions, *Postgraduate Medical Journal*, 77 : 769-773.
- Nweze, E. I., Kechia, F. A., Dibua, U. E., Eze, C., Onoja, U. S., 2015. Isolation of *Cryptococcus neoformans* from Environmental Samples Collected in South-Eastern Nigeria: *Revista do Instituto de Medicina Tropical de Sao Paulo*, 57 : 295-298.
- Osazuwa, O. F., Dirisu, O., Okuonghae, E., 2012. Cryptococcal Antigenemia in Anti-Retroviral Naïve AIDS Patients: Prevalence and its Association with CD4 Cell Count, *Acta Medica Iranica*, 50 : 344-347.
- Oyella, J., Meya, D., Bajunirwe, F., Kamya, M. R., 2012. Prevalence and Factors Associated with Cryptococcal Antigenemia among Severely Immunosuppressed HIV-Infected Adults in Uganda: A Cross-Sectional Study, *Journal of the International AIDS Society*, 15 : 1-7.
- Park, B. J., Wannemuehler, K. A., Martson, B. J., Govender, N., Pappas, P. G., Chiller, T. M., 2009. Estimation of the Current Global Burden of Cryptococcal Meningitis among Persons Living with HIV/AIDS, *Acquired Immune Deficiency Syndrome*, 15 : 525-530.
- Patel, S., Shin, G. Y., Wijewardana, I., Vitharana, S. R., Cormack, I., Pakianathan, M., Harrison, T. S., Bicanic, T., 2013. The Prevalence of Cryptococcal Antigenemia in Newly Diagnosed HIV Patients in a Southwest London Cohort, *Journal of Infection*, 66 : 75-79.
- Pongsai, P., Atamasirikul, K., Sungkanuparph, S., 2010. The Role of Serum Cryptococcal Antigen Screening for the Early Diagnosis of Cryptococcosis in HIV-infected Patients with Different Ranges of CD4 Cell Counts, *Journal of Infection*, 60 : 474-477.
- Saag, M. S., Graybill, R. J., Larsen, R. A., Pappas, P. G., Perect, J. R., Powderly, W. G., Sobel, J. D., Dismukes, W. E., 2000. Practice Guidelines for the Management of Cryptococcal Disease, *Clinical Infectious Diseases*, 30 : 710-718.
- Salami, A. K., Ogunmodede, J. A., Fowotade, A., Nwabuisi, C., Wahab, K. W., Desalu, O. O., Fadeyi, A., 2009. Cryptococcal Meningitis in a Newly Diagnosed AIDS Patient: A Case Report, *West African Journal of Medicine*, 28 : 343-346.
- Soltani, M., Bayat, M., Hashemi, S. J., Zia, M., Pestechian, N., 2013. Isolation of *Cryptococcus neoformans* and other Opportunistic Fungi from Pigeon Droppings, *Journal of Research in Medical Sciences*, 18 : 56-60.
- UNAIDS (2006). Factsheet on Sub-Saharan Africa. accessed on 26/5/2017. [http://data.unaids.org/pub/globalreport/2006/200605-fs\\_subsaharanafrica\\_en.pdf](http://data.unaids.org/pub/globalreport/2006/200605-fs_subsaharanafrica_en.pdf)
- Usman, A. D., Uba, A., 2011. A Survey of Bacterial and Fungal Opportunistic Infections among HIV Clients in Kano Metropolis, *Bayero Journal of Pure and Applied Sciences*, 4 : 148-152.
- Velagapudi, R., Hsueh, Y. P., Geunes-Boyer, S., Wright, J. R., Heitman, J., 2009. Spores as Infectious Propagules of *Cryptococcus neoformans*, *Infectious Immunology*, 77 : 4345-4355.
- Wajanga, B. M. K., Kalluvya, S., Downs, J. A., Johnson, W. D., Fitzgerald, D. W., Peck, R. N., 2011. Universal Screening of Tanzanian HIV Infected Adult Inpatients with the Serum Cryptococcal Antigen to Improve Diagnosis and Reduce Mortality: An Operational Study, *Journal of the International AIDS Society*, 14 : 48-50.
- Wallace, R. S., Meyer, W., Wanke, B., Costa, S. P., Trilles, L., Nascimento, J. L., Medeiros, R., Morales, B. P., Bezerra, C. C., Macedo, R. C., Ferreira, S. O., Barbosa, G. G., Perez, M. A., Nishikawa, M. M., Lazera, M. S., 2008. Primary Endemic Cryptococcosis *gattii* by Molecular Type VGII in the State of Pará, Brazil, *Memorias do Instituto Oswaldo Cruz*, 103 : 813-818.
- World Health Organization (2011). Rapid advice: diagnosis, prevention and management of Cryptococcal disease in HIV-infected adults, adolescents and children. 5-20; accessed on 26/5/2017, [https://www.who.int/hiv/pub/cryptococcal\\_disease2011/](https://www.who.int/hiv/pub/cryptococcal_disease2011/)