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The Specific Neuroanatomical Features of Nyaope Addiction and Associated Co-Morbid Psychiatric Disorders.

A full dissertation submitted to the Faculty of Health Sciences, University of the Witwatersrand in fulfilment of the requirements of the degree Master of Science in Medicine

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Degree: MSc Med

Supervisors: Dr Tanya Calvey, PhD

Prof Martijn van den Heuvel, PhD

24 June 2021

Abstract

Nyaope is the street name for what is believed to be a drug cocktail in South Africa although recent research suggests that it is predominantly heroin. Nyaope powder is most commonly smoked together with cannabis, a drug-use pattern unique to the region. Due to the increasing burden of this drug in low-income communities and the absence of human structural neuroimaging of combination heroin and cannabis use disorder, we initiated the first ever cohort study in order to identify the neuroanatomical features of the disorder. We also sought to characterize the neuroanatomical sequalae of various clinical features.

Twenty-eight male nyaope users and thirty healthy, matched controls were recruited from drug rehabilitation centers and the community, respectively. T1-weighted MRI images were obtained using a 3 Tesla General Electric Discovery and cortical and subcortical volumetric properties were examined and compared.

Nyaope users displayed extensive grey matter atrophy in the right hemispheric medial orbitofrontal, rostral middle frontal, superior temporal, superior frontal, and supramarginal gyri (two-sided t-test, $p < 0.05$, corrected for multiple comparisons). No significant cortical or subcortical effects were found in clinical features such as relapse rate or current depressive episode.

Our findings suggest cortical abnormality in nyaope users in regions involved in impulse control, decision making, social- and self-perception, and working memory. Importantly, affected brain regions show large overlap with the pattern of cortical abnormalities shown in heroin use disorder. Our findings suggest that treatment should include opioid agonist maintenance therapy according to the World Health Organization (WHO) guidelines.

Declaration

University of the Witwatersrand, Johannesburg

School of Anatomical Sciences

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Declaration by Students

I Nhanisi Awakhiwe Ndlovu (Student number: 854185) am a student registered for MSc Med in the year 2021 . I hereby declare the following:

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R14/49 Dr Tanya Calvey et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170302

NAME: (Principal Investigator)	Dr Tanya Calvey et al
DEPARTMENT:	School of Anatomical Sciences Parklane Clinic Chris Hani Baragwanath Academic Hospital University of the Witwatersrand Empilweni Substance Abuse Rehabilitation Centre
PROJECT TITLE:	Structural and Connectivity Characterization of the Brains of Nyaope Users
DATE CONSIDERED:	31/03/2017
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	
APPROVED BY:	Professor P. Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	19/05/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 10004,10th floor, Senate House/3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand. I/We fully understand the conditions under which I am/we are authorised to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. in this case, the study was initially review March and will therefore be due in the month of March each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

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