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Abstract

Assessing the Immune-Modulatory Effects of Indigenous Plants on Lymphocytes and Neutrophils †

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Background: Infectious diseases continue to pose a worldwide health issue, intensified by the capacity of bacteria such as *Staphylococcus aureus* and *Pseudomonas aeruginosa* to elude host immune responses through mechanisms involving biofilm formation, intracellular survival, and the release of cytolytic toxins. These methods undermine both innate and adaptive immunity. Due to increasing antimicrobial resistance, there is a surge of interest in traditional medicinal plants for their possible immunomodulatory effects. *Kigelia africana* and the *Olea europaea* subspecies *africana*, which is prevalent in African ethnomedicine, have been identified for their antibacterial and anti-inflammatory phytochemicals; nonetheless, their impact on immune cell activities is still under-investigated. Objectives: This study aims to assess the immuno-modulatory effects of acetone fruit extracts from *Kigelia africana* and *Olea africana* on two primary immune cell types: lymphocytes and neutrophils, by evaluating cell proliferation, reactive oxygen species (ROS), and nitric oxide (NO) generation. Method: *Kigelia africana* and *Olea africana* were collected from the University of Limpopo campus. Crude extracts were obtained using acetone extraction and screened for phytochemicals using conventional qualitative assays. Human lymphocytes and neutrophils were isolated from donor blood using MACSxpress magnetic separation. Lymphocyte proliferation was measured using a water-soluble tetrazolium salt (WST-8) assay over 24 h, with lipopolysaccharide (LPS) stimulation as a positive control. Neutrophil-reactive species and nitric oxide production were assessed using fluorometric and Griess reagent-based methods, respectively. Treatments involved increasing concentrations of plant extracts (15.6–500 µg/mL), and the data were analyzed in triplicates. Results: Phytochemical screening verified the presence of flavonoids, phenols, tannins, glycosides, and saponins, with each plant exhibiting unique profiles. The extracts stimulated a dose-dependent enhancement in lymphocyte proliferation, with both plants demonstrating substantial stimulatory effects across all studied concentrations. In neutrophils, both extracts significantly increased reactive oxygen species and nitric oxide generation, especially at higher concentrations, suggesting the activation of microbicidal pathways. The lowest amounts demonstrated significant immunological response, indicating substantial bioactivity at lower concentrations. Conclusions: The acetone extracts of *Kigelia africana* and *Olea africana* exhibit prominent immunomodulatory effects by stimulating lymphocyte proliferation and increasing reactive oxygen species and nitric oxide generation in neutrophils. These findings validate their conventional application in infection control and indicate their potential as sources for innovative immunomodulatory drugs. Additional studies are required to identify the precise bioactive compounds and validate their mechanisms of action and safety in vivo.

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