

## **Topical application of *Acacia nilotica* pods' water extract enhances wound healing in Sprague-Dawley rats by alleviating oxidative stress and suppressing pro-inflammatory cytokines**

Sulaiman Sani Kankara<sup>a,b</sup>, Dahiru Sani<sup>c</sup>, Muskhazli Mustafa<sup>b</sup>, Mohd Hafiz Ibrahim<sup>b</sup> and Rusea Gob<sup>b,\*</sup>

<sup>a</sup>Department of Biology, Faculty of Natural and Applied Sciences, Umaru Musa Yar'adua University, P.M.B. 2218 Katsina State, Nigeria.

<sup>b</sup>Department of Biology, Faculty of Science, Universiti Putra Malaysia 43400 Serdang, Selangor Darul-Ehsan Malaysia.

<sup>c</sup>Pharmacology Laboratory, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor Darul-Ehsan Malaysia.

### **Abstract**

This study was conducted to validate the folkloric use of *Acacia nilotica* pods as wound healing agent. Full thickness excision wounds of 6mm diameter were created on Sprague-Dawley rats. Prior to the wound healing assessment, the antioxidant activity of the extract was determined *in vitro* using 2,2'-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity. Six groups of 6 wounded rats were formed. In each group, the wounds were topically treated with either petroleum jelly (vehicle control), silver sulfadiazine (positive control), 0.5%, 1% or 2% *Acacia nilotica* cream (treatment groups) prepared by mixing appropriate quantity of *A. nilotica* pods' aqueous extract with petroleum jelly. The negative control group received no treatment. The wound healing parameters assessed include wound contraction rate, level of pro-inflammatory cytokines Interleukin1 $\beta$  (IL-1  $\beta$ ) and Tumor Necrosis Factor- $\alpha$  (TNF-  $\alpha$ ) and histopathological analysis of the wound area. Wounds were assessed on 7<sup>th</sup> and 14<sup>th</sup> post wounding days. The extract showed a good, dose dependent DPPH-radical scavenging activity comparable to trolox. Topical application of *A. nilotica* cream significantly ( $P < 0.05$ ) enhances wound contraction rate compared to the control groups in both 7<sup>th</sup> and 14<sup>th</sup> days of evaluation. The extract also significantly suppressed the expression of both IL-1 $\beta$  and TNF- $\alpha$  in dose dependent manner throughout the study period. The histological analysis revealed that the extract treatment enhanced cellular proliferation as evident by the increased capillary vessels, re-epithelization and dermal tissues regeneration. Overall study suggest that *A. nilotica* pods' water extract promotes wound healing in Sprague-Dawley rats by ameliorating oxidative stress and suppression of pro-inflammatory cytokines. This study validates the folkloric use of *A. nilotica* pods for postpartum wound healing for the first time. Further studies aimed at identifying and isolating active principles from this plant is recommended.

Keywords: *Acacia nilotica*, wound healing, oxidative stress, pro-inflammatory cytokines.

\*Corresponding author: rusea@upm.edu.my