



Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Potential study of healing *Musa paradisiaca* L.

Jirliane Martins dos Santos¹, Eliane Aparecida Campesatto²,
Izabelle Cristina Acioly de Omena¹, Luciano Aparecido Meireles Grillo¹,
Ednaldo Cavalcante de Araújo³ and Maria Lysete de Assis Bastos^{1*}

¹Research Laboratory in Wound Care, School of Nursing and Pharmacy, Federal University of Alagoas, Brazil

²Laboratory of Pharmacology and Immunity, Institute of Biological Sciences and Health, Federal University of Alagoas, Brazil

³Department of Nursing, Federal University of Pernambuco, Brazil

ABSTRACT

The study aimed to evaluate the potential for healing wounds of leaves and pseudostem of *Musa paradisiacal* Linn (banana). The *Musa* is a plant easily found throughout Brazil. Extracts project approved by the Ethics Committee on Animal Use of the Federal University of Alagoas, N° 018726/2011-19. The *in vivo* healing test used 36 *Rattus norvegicus Albinus* divided into four groups ($n = 09$). Concocted up wounds of 1.5 cm², the dorsal region of the animals, which were treated daily with ointment *Musa* 02: leaf, ointment *Musa* 04: pseudostem; ointment base: negative control and dexpanthenol: positive control. On the 14th day after surgery, macroscopically, the lesions treated with the leaves of the extract obtained a smaller area as well, the same statement in the histopathological study showed more organized healing process when compared to the other groups.

Keywords: Nursing Research; *Musa*; Wound Healing.

INTRODUCTION

This study showed that the *Musa* genus has antimicrobial and healing action [1]. The description of these actions showed the conduction of pre-clinical trials with the plant species *Musa paradisiaca* for wound healing. As the wound care is singular of nursing [2], becoming important the participation of nurses in experimental studies using plants for this purpose. Wound healing has a cascade of events comprising the following phases: inflammatory, proliferative and remodeling [2-3]. The objective of the research was to evaluate the potential healing of wounds of the extracts of leaves and *Musa paradisiacal* L. pseudostem.

EXPERIMENTAL SECTION

Project approved by the Ethics Committee on the Animal Use of the Federal University of Alagoas, N° 018726/2011-19. Samples from *M. paradisiacal* L., leaves and pseudostem were collected in the municipality of União dos Palmares/AL (geographical coordinates S09°09'46" and O36°01'55"). The identification was carried out at the Institute of the Environment of the State of Alagoas, herbarium cataloged with MAC 54889. There were 200 g of each part used, fresh crushed, frozen in vials of Thermo Savant Lyophilizer (Micro Modulyo®), kept for 72 hours until complete dehydration [4]. Of this material, two ointments with 50 mg / g of extract were produced.

In the *in vivo* healing test, 36 *Rattus norvegicus albinos* - Wistar (male - 3 months old) were used divided into four groups ($n = 09$). A 1.5 cm² lesion was confectioned in the dorsal region of the animals, removing the skin tissue. Surgical Procedure and the three biopsies were performed under anesthesia induced by intramuscular injection of 50 mg/kg ketamine at 10% and 10 mg/kg xylazine at 2%, administered 0.1 mL per 100 g of body weight of the animal.

The animals were monitored for 15 days and the wounds treated daily with 0.9% saline solution and application of the ointments, as follows: *Musa* 02: base ointment containing *Musa* leaf extract; *Musa* 04: base ointment containing *Musa* pseudostem extract; Negative control: Base ointment (lanolin/vaseline 1:1); Positive Control: dexpanthenol (50 mg/g) [5].

Macroscopic evaluation of the lesions has measured the diameter contraction of the edges. Microscopic analysis was performed by histological examination of the material collected for biopsy, and the inflammatory, proliferative and remodeling phases were taken as a reference, which is part of the healing process [3]. From this perspective, the presence of fibrin, hyperemia and increased blood flow, inflammatory infiltration, fibrin, fibroblast proliferation, epithelialization, partial epithelial hyperplasia, fibroblast proliferation (strengthening of the scar), marked epithelial hyperplasia, intense vascular neoformation, and collagen fibers were investigated.

RESULTS AND DISCUSSION

The curve of contraction diameter of the lesions edges (Figure 1) in all groups had no statistical difference. However, the aqueous extract of banana leaf (*Musa* 2) had the smallest area on the 14th day after surgery.

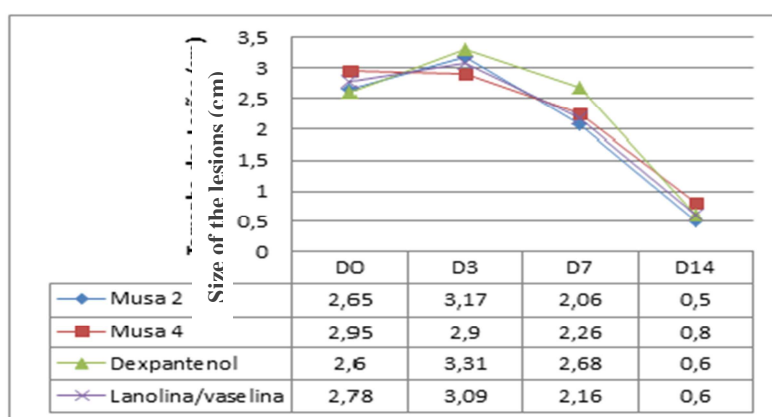


Figure 1 - Monitoring of the average size (cm²) of the lesion during the experiment
Source: The author, 2016

Histopathological analysis of lesions in *Musa* 2 group revealed important findings in the healing process, which is a most promising extract (Figure 2).

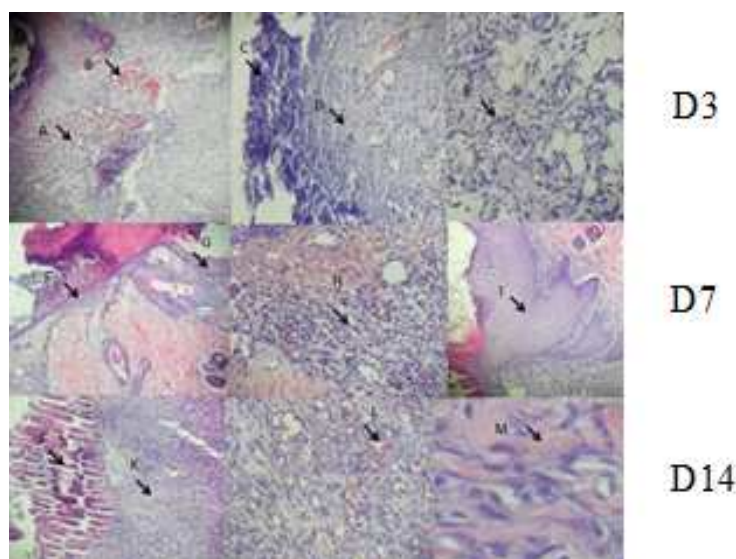


Figure 2 - Photomicrographs of the lesions in *Musa* 2 Group according to the day of the biopsy. A: fibrin, B: hyperemia and increased blood flow, C: inflammatory infiltration D: fibrin, E: fibroblast proliferation, M: Partial reepithelialization, G: epithelial hyperplasia, H: fibroblast proliferation (strengthening of the scar), I: severe epithelial hyperplasia, J: Fibrin, K: inflammatory infiltration, L: intense vascular neoformation, M: collagen fibers. HE Staining, 10X increased.

Source: The author, 2016

Analyzing the size of the animal lesions, it was found a similarity between the experimental, positive control and negative control groups. In subsequent days of the treatment, the wound area was regressing, indicating potential healing of the substances used, highlighting the aqueous extract of banana leaf (*Musa 2*) having the lowest area.

The healing action of methanol and aqueous extracts of banana was studied in rat wounds and both extracts detected increase in hydroxyproline acid, hexosamine and superoxide dismutase as well as the tensile strength of the wound and reduced glutathione level, decreasing the area of the wound, healing it. The effects have been attributed to the antioxidant property of the banana [5-6].

Histological evaluation of the wounds of euthanized animals on the third day after surgery showed that the lesions treated with *Musa 2* ointment had a better appearance in histological sections than in the other groups, with the presence of fibrin, hyperemia with increased blood flow, inflammatory infiltration, fibrin and fibroblast proliferation. These features are from the inflammation or exudative phase, which usually lasts four to five days [7]. On the seventh day after surgery, it was observed that the lesions treated with *Musa 2* ointment showed a partial re-epithelialization, epithelial hyperplasia, fibroblast proliferation with a new extracellular matrix and marked epithelial hyperplasia, characterizing the proliferative phase. In this phase, there is the formation of granulation tissue and fibroblasts were the main cells in this phase [3]. Histological sections of the fourteenth day after surgery were also more organized with the *Muse 2* treatment, observing mainly intense vascular neoformation and collagen fibers, setting the remodeling or maturation phase [3].

CONCLUSION

Research involving plants are essential to contribute in new therapeutics, especially in nursing care for the treatment of wounds. In this study, the aqueous extract of *Musa 2* showed a more organized healing process when compared to other groups, suggesting more pre-clinical trials with isolated fractions and substances for the development of innovative products coming from Northeastern flora.

REFERENCES

- [1] JM Santos, EA Campesatto, MLA Bastos, et al. *Rev enferm UFPE*, **2012**, 6(8), 1948-57.
- [2] RAN Moreira, TA Queiroz, MF Araújo, TM Araújo, JA Caetano. *Rev. Rene*, **2009**, 10(3):83-9.
- [3] RJ Mendonca, J Coutinho-Netto. *An Bras Dermatol*, **2009**, 84(3), 257-62.
- [4] UV Santos, BS Santos, GF Silva, PBL Constant, et al. *Rev GEINTEC*, **2014**, 4(4), 1399-408.
- [5] AP Lima, NS Leite, EA Camargo, CS Estevam, et al. *Scientia Plena*, **2010**, 6(3), 1-7.
- [6] PK Agarwal, A Singh, K Gaurav, et al. *Indian J Exp Biol*, **2009**, 47(1), 32-40.
- [7] C Janning, CAC Albuquerque, SC Barauna. *Rev Eletr Farm.* **2011**, 8(3), 53-4.