The Effects of Euterpe oleracea Mart. (Açaí) Extract on the Survival of Random-Pattern Skin Flaps in Rats

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INTRODUCTION: Flap necrosis remains a major complication of reconstructive surgery. *Euterpe oleracea* Mart., popularly known as “açaí,” is cultivated in the Amazon region of Brazil. It contains hydroxybenzoic acids, antioxidant polyphenolics, flavan-3-ols, and anthocyanins. Açaí exhibits anti-inflammatory action through the inhibition of cyclooxygenases 1 and 2[1], vasodilation, inhibition of nitric oxide production, inducible nitric oxide synthase activity and expression, and antioxidant properties[2]. Current study demonstrates that polyphenolics increase cutaneous angiogenesis[3]. This study evaluated whether açaí could improve the survival of random-pattern skin flaps in an experimental rat model.

MATERIALS AND METHODS: Thirty male Sprague-Dawley rats were randomly divided into two groups: the açaí treatment group(n=15), and the control group(n=15). In açaí and control groups, 3x9cm dorsal skin flaps including the panniculus carnosus were elevated and sutured back into place(Figure 1). To block the new blood supply from the bed, a silicone sheet was placed under the flaps[4]. In açaí treatment group, 100 mg/kg/day of açaí stone extract[5] was administered in drinking water for 7 days. Control group received saline. Seven days post-procedure, flap survival was measured and histologic specimens were harvested from the flap midline. Histologic examination, inflammatory mediator detection, and immunohistochemical analysis were performed.

RESULTS: The percentage of flap survival was higher in açaí treatment group(80.21±9.05%) than in control group(60.08±8.53%)($P<0.05$). Açaí treatment group had more VEGF-positive cells than control group on immunohistochemistry($P<0.05$). CD31-positive microvascular densities were significantly higher in açaí treatment group than in control group($P<0.05$). Anti-α-smooth muscle actin antibody expression was also significantly higher in açaí treatment group than in control group(16.47±4.32/HPF vs. 7.40±2.69/HPF, respectively; $P<0.05$). Western blot analysis of the expression of anti-VEGF in lysates revealed significantly greater VEGF protein expression in açaí treatment group compared with control group(1.11±0.17 vs. 0.39±0.09, respectively; $P<0.05$)(Figure 2).

CONCLUSION: This study found that açaí intake increased neovascularization and mitigated tissue damage and inflammatory responses; açaí treatment was also associated with a higher percentage of random-pattern skin flap area survival.

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FIGURE LEGEND:
Figure 1. The caudally based random pattern skin flap(3 x 9 cm) was elevated on the dorsum of rat.

Figure 2. Açaí stone extract increases the expression of VEGF determined by Western blot analysis in flap midline specimens from Sprague-Dawley rats. Results are represented as mean±SEM; n=10 for each group, *P<0.05