

Stereological and Morphometric Evaluation of Wound Healing Burns Treated with Ulmo Honey (*Eucryphia cordifolia*) Unsupplemented and Supplemented with Ascorbic Acid in Guinea Pig (*Cavia porcellus*)

Authors : Carolina Schencke, Cristian Sandoval, Belgica Vasquez, Mariano Del Sol

Abstract : Introduction: In a burn injury, the successful repair requires not only the participation of various cells, such as granulocytes and fibroblasts, but also of collagen, which plays a crucial role as a structural and regulatory molecule of scar tissue. Since honey and ascorbic acid have presented a great therapeutic potential to cellular and structural level, experimental studies have proposed its combination in the treatment of wounds. Aim: To evaluate stereological and morphometric parameters of healing wounds, caused by burns, treated with honey Ulmo (*Eucryphia cordifolia*) unsupplemented, comparing its effect with Ulmo honey supplemented with ascorbic acid. Materials and Methods: Fifteen healthy adult guinea pigs (*Cavia porcellus*) were used, of both sexes, average weight 450 g from the Centro de Excelencia en Estudios Morfológicos y Quirúrgicos (CEMyQ) at the Universidad de La Frontera, Chile. The animals were divided at random into three groups: positive control (C+), honey only (H) and supplemented honey (SH) and were fed on pellets supplemented with ascorbic acid and water ad libitum, under ambient conditions controlled for temperature, ambient noise and a cycle of 12h light-darkness. The protocol for the experiment was approved by the Scientific Ethics Committee of the Universidad de La Frontera, Chile. The parameters measured were number density per area (NA), volume density (VV), and surface density (SV) of fibroblast; NA and VV of polymorphonuclear cells (PMN) and, evaluation of the content of collagen fibers in the scar dermis. One-way ANOVA was used for statistics analysis and its respective Post hoc tests. Results: The ANOVA analysis for NA, VV and SV of fibroblasts, NA and VV of PMN, and evaluation of collagen content, type I and III, showed that at least one group differs from other ($P \leq 0.001$). There were differences ($P = 0.000$) in NA of fibroblast between the groups [$C+ = 3599.560 \text{ mm}^{-2}$ (SD= 764.461), $H = 3355.336 \text{ mm}^{-2}$ (SD= 699.443) and $SH = 4253.025 \text{ mm}^{-2}$ (SD= 1041.751)]. The VV and SV of fibroblast increased ($P = 0.000$) in the SH group [20.400% (SD= 5.897) and $100.876 \text{ mm}^2/\text{mm}^3$ (SD= 29.431), respectively], compared to the C+ [16.324% (SD= 7.719) and $81.676 \text{ mm}^2/\text{mm}^3$ (SD= 28.884), respectively]. The mean values of NA and VV of PMN were higher ($P = 0.000$) in the H [756.875 mm^{-2} (SD= 516.489) and 2.686% (SD= 2.380), respectively] group. Regarding to the evaluation of the content of collagen fibers, type I and III, the one-way analysis of ANOVA showed a statistically significant difference ($P < 0.05$). The content of collagen fibers type I was higher in C+ (1988.292 μm^2 ; SD= 1312.379), while the content of collagen fibers type III was higher in SH (1967.163 μm^2 ; SD= 1047.944 μm^2) group. Conclusions: The stereological results were correlated with the stage of healing observed for each group. These results suggest that the combination of honey with ascorbic acid potentiate the healing effect, where both participated synergistically.

Keywords : ascorbic acid, morphometry, stereology, Ulmo honey

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