



Camel whey protein enhances diabetic wound healing in a streptozotocin-induced diabetic mouse model: the critical role of β -Defensin-1, -2 and -3

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Abstract:

Background: Delayed wound healing is considered one of the most serious diabetes-associated complications. The presence of replicating organisms such as bacteria within a diabetic's wound is considered one of the most important factors that impair cutaneous wound healing and the potential cellular and/or molecular mechanisms that are involved in the healing process. Defensins, which are anti-microbial peptides, have potent bactericidal activity against a wide spectrum of the bacterial and fungal organisms that are commonly responsible for wound infections. We recently demonstrated that camel whey proteins (WPs) expedite the healing of diabetic wounds by enhancing the immune response of wounded tissue cells and by alleviating some of the diabetic complications. **Methods:** In the present study, we investigated the effects of WP supplementation on the mRNA and protein expression levels of β -defensin-1 (BD-1), 2 and 3 and subsequently on the wound healing process in a streptozotocin (STZ)-induced diabetic mouse model. In this study, three groups of mice were used (10 mice per group): group 1, the non-diabetic mice (control); group 2, the diabetic mice; and group 3, the diabetic mice that received a daily supplement of undenatured WP (100 mg/kg of body weight) via oral gavage for 1 month. **Results:** Compared with the non-diabetic control mice, the diabetic mice exhibited delayed wound closure that was characterized by a reduction in hydroxyproline content (indicator of collagen deposition), a marked elevation in free radical levels and a prolonged elevation in the levels of inflammatory cytokines, including interleukin-6 (IL-6), transforming growth factor-beta (TGF- β) and tumor necrosis factor-alpha (TNF- α). Interestingly, compared with the diabetic mice that did not receive WP supplementation, the diabetic mice with WP had an accelerated closure and healing process of their wounds. The WP supplementation also decreased their levels of free radicals and restored their hydroxyproline content; proinflammatory cytokine levels; and expression of BD-1, 2 and 3 in the wounded tissue. **Conclusion:** WP supplementation may be beneficial for improving the healing and closure of diabetic wounds.

Keywords:

Diabetes, Defensins, Pro-inflammatory cytokines, Whey protein, Wound healing

Published In:

Lipids in Health and Disease , Vol.12 , PP.46-56