

## ***In vitro* Analysis of the Anti-inflammatory Activity of Sri Lankan Bees' Honey, *Aloe vera*, their Combination, and the Development of a Topical Anti-inflammatory Gel**

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### **Abstract**

Clinicians and scientists are on the lookout for the development of safer, sustainable alternatives for topical corticosteroids in treating inflammatory skin diseases due to the potential complications associated with their long-term use. Although both honey and *Aloe vera* have been individually studied for their anti-inflammatory action, there is only limited research on the specific combination of Sri Lankan bee's (SLB) honey with *Aloe vera*. In this study, the anti-inflammatory activities of the individual components and combinations are evaluated. A heat-induced albumin denaturation assay was used. Data analysis was carried out using the GraphPad Prism 9 software. At 5000 µg/mL, the highest of the concentration range used in this study. The aqueous solutions of SLB honey and crude *Aloe vera* exhibited moderate anti-inflammatory activities of 8.19±0.08% and 8.14± 0.93%, respectively. Lyophilization of the crude *Aloe vera* gel effectively increased its activity up to 77.53±0.16%, at the same concentration. The combinations of SLB honey with crude *Aloe vera*, and SLB honey with lyophilized *Aloe vera* demonstrated a percentage inhibition of albumin denaturation of 12.59±2.4% and 86.51±0.2% respectively. Thus, when combined, SLB honey with *Aloe vera* show higher activity compared to their individual counterparts. The concentrations at which optimal activity was observed were selected for formulation. Accordingly, three novel topical anti-inflammatory gels were formulated with 0.125%, 0.25%, and 0.5% SLB honey and lyophilized *Aloe vera* (1:1) which exhibited relatively high activities of 71.57±0.48%, 76.56±0.24%, and 81.38±0.21% respectively. The organoleptic properties, pH, and spreadability of the gels were observed to be stable over a 60-days period at 4°C, room temperature, and 40°C. With further optimization and testing, the gels would show a promising potential to be developed into a clinically useful product.

**Keywords:** *Anti-inflammatory, SLB honey, Aloe vera, Topical gels, Albumin denaturation*