

## Evaluation of Antimicrobial and Anti-Inflammatory Activity of Doani Sidr Honey and Madecassoside against Propionibacterium Acnes

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**Abstract :** Acne is a chronic inflammatory disease of the sebaceous glands characterized by areas of skin with seborrhea, comedones, papules, pustules, nodules, and possibly scarring. Propionibacterium acnes (P. acnes), plays a key role in the pathogenesis of acne. Their colonization and proliferation trigger the host's inflammatory response leading to the production of pro-inflammatory cytokines such as interleukin-8 (IL-8) and tumour necrosis factor- $\alpha$  (TNF- $\alpha$ ). The usage of honey and natural compounds to treat skin ailments has strong support in the current trend of drug discovery. The present study was carried out evaluate antimicrobial and anti-inflammatory potential of Doani Sidr honey and its fractions against P. acnes and to screen madecassoside alone and in combination with fractions of honey. The broth dilution method was used to assess the antibacterial activity. Also, ultra structural changes in cell morphology were studied before and after exposure to Sidr honey using transmission electron microscopy (TEM). The three non-toxic concentrations of the samples were investigated for suppression of cytokines IL 8 and TNF  $\alpha$  by testing the cell supernatants in the co-culture of the human peripheral blood mononuclear cells (hPBMCs) heat killed P. acnes using enzyme immunoassay kits (ELISA). Results obtained was evaluated by statistical analysis using Graph Pad Prism 5 software. The Doani Sidr honey and polysaccharide fractions were able to inhibit the growth of P. acnes with a noteworthy minimum inhibitory concentration (MIC) value of 18% (w/v) and 29% (w/v), respectively. The proximity of MIC and MBC values indicates that Doani Sidr honey had bactericidal effect against P. acnes which is confirmed by TEM analysis. TEM images of P. acnes after treatment with Doani Sidr honey showed completely physical membrane damage and lysis of cells; whereas non honey treated cells (control) did not show any damage. In addition, Doani Sidr honey and its fractions significantly inhibited (> 90%) of secretion of pro-inflammatory cytokines like TNF  $\alpha$  and IL 8 by hPBMCs pretreated with heat-killed P. acnes. However, no significant inhibition was detected for madecassoside at its highest concentration tested. Our results suggested that Doani Sidr honey possesses both antimicrobial and anti-inflammatory effects against P. acnes and can possibly be used as therapeutic agents for acne. Furthermore, polysaccharide fraction derived from Doani Sidr honey showed potent inhibitory effect toward P. acnes. Hence, we hypothesize that fraction prepared from Sidr honey might be contributing to the antimicrobial and anti-inflammatory activity. Therefore, this polysaccharide fraction of Doani Sidr honey needs to be further explored and characterized for various phytochemicals which are contributing to antimicrobial and anti-inflammatory properties.

**Keywords :** Doani sidr honey, Propionibacterium acnes, IL-8, TNF alpha

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