

Quillaja saponaria saponin-rich extract shows anti-inflammatory activity, protecting and repairing against UV-induced skin damage

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● INTRODUCTION

An increasing number of consumers are looking for natural ingredients with proven efficacy. The Quillaja saponaria tree is endemic to Chile. The extract has a specific saponin content and has been used as a stabilizer of colloidal structures [2] or as an immune adjuvant for vaccines [3]. It also has shown antimicrobial and antiviral properties [4,5] and has been proposed as a sebium regulator [6]. In the cosmetic industry, saponins from Quillaja saponaria have been used as natural emulsifiers for nano-emulsions [7] or to substitute synthetic surfactants [8]. In the present paper we explore the biological properties of the extract and investigate its potential application as an anti-inflammatory agent to reduce skin irritation and damage.

● MATERIALS & METHODS

Normal Human Epidermal Keratinocytes (NHEK) were incubated with Quillaja extracts (9% and 15% saponins). Phorbol Myristate Acetate (PMA) was added at 0.1 µg/ml with or without Quillaja extracts. A non-PMA stimulated control was run in parallel. mRNA was extracted and run on an Affymetrix chip. Data were expressed as Arbitrary Units (a.u.). At least ≤ 0.5 decrease fold change and a ≥ 2 increase fold change in mRNA expression was considered significant.

Twenty healthy Caucasian women (average age 47 years old) were enrolled. Skin Redness and Trans Epidermal Water Loss (TEWL) were evaluated instrumentally as end points (Mexameter 18 and Tewameter® TM 300). Quillaja extract (15% saponins) at 0.5% or 1% in a gel or a Placebo, were applied either before or after UV irradiation. Two skin areas were treated with the Quillaja formulations, one area was treated with a Placebo and one area remained untreated.

● RESULTS

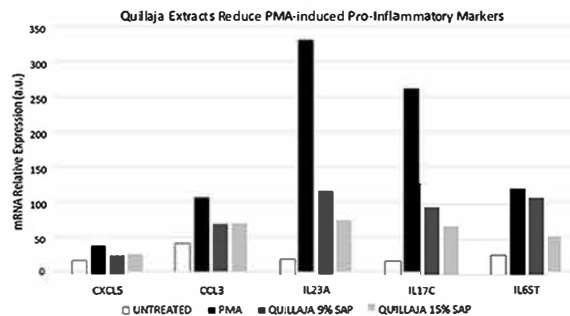


Figure 1. Quillaja Extract (0.00037%) with either 9% or 15% saponins (SAP), reduced mRNA transcription for pro-inflammatory cytokines and chemokines in the presence of PMA at 0.1 µg/ml. CXCL5: CXC motif chemokine 5, CCL3: chemokine C-C motif ligand 3, IL23A: interleukin 23 subunit alpha, IL17C: interleukin 17C, IL6ST: interleukin 6 signal transducer; a.u.: arbitrary units.

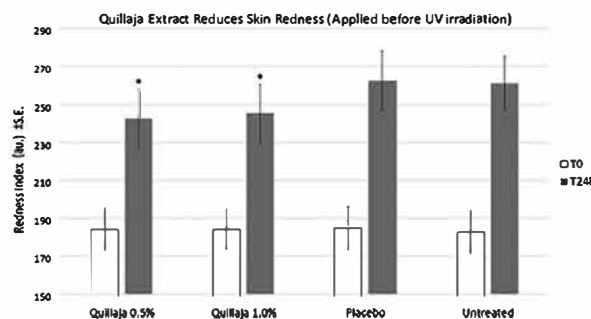


Figure 2. Quillaja extract (15% saponins), significantly reduced UV-induced skin redness after 24 hours (-10%, -12% for 0.5% and 1% Quillaja respectively vs Placebo, *p<0.05, Student's t test. a.u.: arbitrary units, S.E.: standard error.

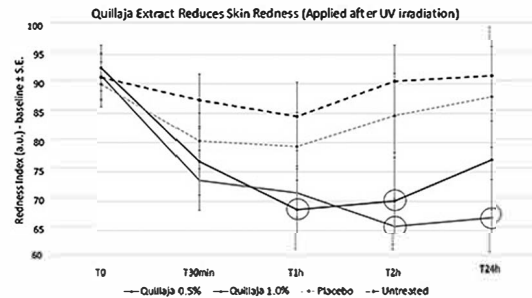


Figure 3. Quillaja extract (15% saponins), significantly reduced UV-induced skin redness overtime (-20%, -25% 24 hours after UV with 0.5% and 1% Quillaja respectively vs Placebo, in circle p<0.05, Student's t test). a.u.: arbitrary units, S.E.: standard error.

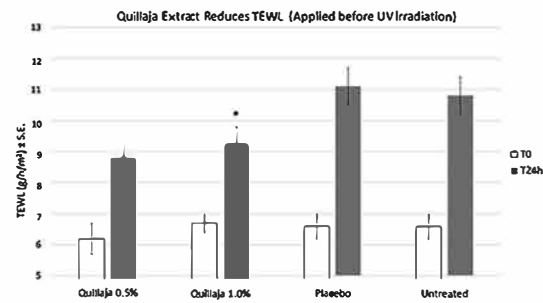


Figure 4. Quillaja extract (15% saponins), significantly reduced UV-induced TEWL after 24 hours (-27.5% with 1% Quillaja vs Placebo, *p<0.01, Student's t test. a.u.: arbitrary units, S.E.: standard error.

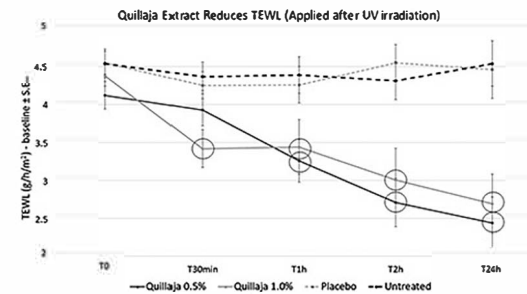


Figure 5. Quillaja extract (15% saponins), significantly reduced UV-induced TEWL overtime (-37%, -39.2% 24 hours after UV with 0.5% and 1% Quillaja respectively vs Placebo, in circle p<0.01, Student's t test). a.u.: arbitrary units, S.E.: standard error.

● CONCLUSIONS

We have demonstrated, both in vitro and clinically, the capacity of saponin-rich Quillaja extract to reduce the damaging effect of pro-inflammatory inducers (PMA and UV) in a dose dependent manner. We believe that by helping to reduce UV induced skin damage, Quillaja Extract can be considered a powerful and natural adjuvant in topical formulations designed for before and after sun exposure.

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