

Quinoa Bioester: An in-depth and comparative study to evaluate its potential for skin maintenance and improvement versus vegetable oils recognized as nutritive in cosmetic products.

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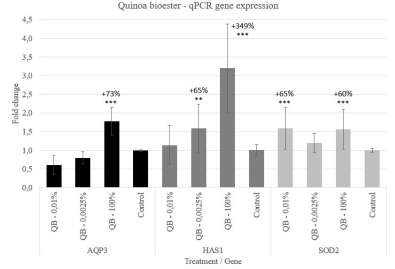
Scientific: Patrícia Valverde, Daniela, Catarina, Carolina, Stuart, Rodrigo, Schuck, Desires, Bosquetti, Bruna.
R&D, Boticário Group, São José dos Pinhais, Brazil

Introduction:

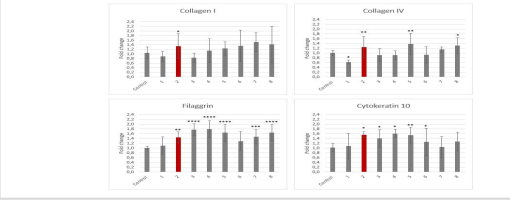
The natural aging process compromise the barrier function and leads the skin to decrease its ability to regulate moisture, regenerate and protect itself. In addition, the natural depletion in substance levels such as hyaluronic acid, which moisturizes the layers of the skin, aggravate the homeostasis (proper functioning) of this entire interconnected system. Therefore, it is so important to use ingredients that bring nutrition, increase cellular energy, reset lipid layers and promote increased production of collagen, elastin and hyaluronic acid. This action helps in the recovery of the skin, hydration and nutrition, leaving the skin with the healthiest appearance[1]. The concept of nourishing a certain tissue of the human body means providing an adequate metabolic balance so this tissue can perform its function in the best possible way. Quinoa (Chenopodium quinoa Willd.) is a vegetable grown for at least 5,000 years and continues to be produced. For the Incas it was considered a sacred plant known as the "mother of the grains" and "wheat of the Incas". This plant produces a small and edible seed, a pseudocereal recognized as a food with high nutritional value due to its composition rich in proteins, vitamin E, minerals and essential fatty acids, omegas 3, 6 and 9. To explore the full cosmetic potential of this highly rich and nutritious grain, the Boticário Group has developed in its own factory a unique and exclusive equipment. Through an innovative process of transesterification and purification, the equipment is capable of performing the extraction of the oily fraction of this cereal, preserving its rich composition of fatty acid derivatives (Omegas 3, 6 and 9) and high concentration of tocopherol [data not published], obtaining the unique and patented ingredient Quinoa Bioester (Chenopodium quinoa seed oil ethyl esters)[4]. According to this specificity, the Quinoa oil mostly used in the cosmetic market consists of a mixture or extract with low concentration, for this reason there was a need to create the exclusive and unprecedented process. It maintains high levels of polyunsaturated Linolenic Acid Derivatives: Rich in unsaturated (up to 85%), polyunsaturated (58%), Rich in Linolenic Acid (6%). Furthermore, Quinoa bioester has high concentrations of tocopherols (60mg/100g) and its characteristic has demonstrated 2.6 times more antioxidant activity than Grape Seed Oil. The bioester form is exclusive to Boticário Group, being a hero ingredient of Nativa Spa brand, the secret that empowers the products of the whole portfolio. Precisely because of all the beneficial properties associated with quinoa, and the rich composition of fatty acids characteristic of this ingredient is the great differential of this active and the potential source of nutritional properties for the skin. These nutritional benefits can be evaluated through a series of indirect measures related to the homeostasis of the functions and viability of skin cells[2].

Results & Discussion:

Gene modulation of aquaporin (aqu3), hyaluronan synthase (HAS1) and superoxide dismutase 2 (SOD2) after incubation for 24 hours with quinoa bioester at different concentrations (100%, 0.01% and 0.0025%). Statistical test ANOVA, Dunnett post-test *p<0.01; p<0.001 (comparison to control).



Collagen I gene modulation, Collagen IV, Filagrina and Cytokeratin 10 after incubation for 24 hours with the samples control mineral oil (control), coconut oil (Coco nucifera) (1), quinoa bioester (2), Brazil nut oil (3), oat oil (4), purified sweet almond oil (5), refined avocado oil (6), chenopodium quinoa seed (7) and canine rose fruit oil (8). Statistical test ANOVA, dunnett's post-test (*P<0.05; **P<0.01; ***P<0.001; ****P<0.0001).



Materials & Methods:

This work has focused on exploring the properties and benefits of Quinoa Bioester for the skin and comparing these results with the ones obtained for vegetable oils recognized by cosmetic science as nutritive. To investigate these benefits, we have evaluated key biomarkers on reconstructed skin samples treated with the oils (Quinoa Bioester, coconut oil, Brazil nut oil, oat oil, sweet almond oil, avocado oil, quinoa extract and rosehip oil). In the laboratory, the 3D reconstructed skin model is generated by seeding primary cells (keratinocytes and dermal fibroblasts) and biomaterials, layer by layer, reaching a final tissue with the dermal and epidermal structure that mimics human skin and can be used in evaluation tests of raw materials and finished products. The evaluated oils were diluted and applied on top of the epidermis followed by incubation at 37°C and 5% CO2 for 24 hours. After this period, RNA extraction was performed, and the gene expression was quantified by qPCR. The following genes were evaluated: collagen I (COL1A1), collagen IV (COL4A1), filaggrin (FLG), aquaporin (aqu3), citoqueratina 10 (KRT10), hyaluronan synthase (HAS1), superoxide dismutase 2 (SOD2).

Conclusions:

Quinoa is a pseudocereal rich in essential fatty acid derivatives which makes it a food with high nutritional value. In addition to their nutritional importance, these molecules can have an important impact on skin health. In this work, the efficacy studies have demonstrated that the Quinoa Bioester (Chenopodium quinoa seed oil ethyl esters) has characteristics and qualities extremely beneficial for the skin, acting positively in the maintenance of homeostasis even at low concentrations. The use of this oil can impart in cosmetic formulations the attributes of: skin nutrition, antioxidant protection against free radicals harmful effects, improvement of skin's ability to lock moisture and maintain hydration. Besides nourishing effect, anti aging properties were also identified, with quinoa bioester being the only oil of natural origin in the comparative study able to stimulate Collagen I production, related to skin firmness, tonus, and elasticity.

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