

New Anti-Pollution Benefits of a Serum with Ascorbic Acid, Ferulic Acid, and Tocopherol in a Human Clinical Trial

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Introduction: Exposure to environmental stressors like particulate matter (PM) and ultraviolet radiation (UV) induces oxidative stress and inflammation in skin and leads to skin barrier dysfunction and premature aging. Metals like iron and/or copper are abundant in PM and are known to contribute to the formation of reactive oxygen species (ROS), which eventually lead to skin damage. Although the use of topical antioxidants has been suggested to help in preventing skin damage, very limited clinical studies have been performed.

Objectives: Our goal was to evaluate the ability of a topical serum containing 15% ascorbic acid, 0.5% ferulic acid, and 1% tocopherol to prevent oxinflammatory skin damage induced by PM with/without UV in a human clinical model.

Materials and Methods: A 4-day double-blinded clinical study was conducted on the back of 15 female subjects aged 18-40 years. During the 4 consecutive days, the back test zones were treated daily with/without the serum, followed by 2 hours of PM with/without 5 minutes of UV daily exposure. The test zone without any treatment served as control. D-squame and biopsy samples were collected for biomarker analysis at the end of study.

Results: After 4 days of daily exposure to PM with/without UV, analysis of D-squame showed significantly greater total iron and copper content, respectively, in the top 3 cutaneous layers compared to control. In addition, application of the serum prevented 45% to 58% of PM- or PM+UV-induced formation of the lipid peroxidation product 4-hydroxynonenal and induction of the inflammatory product cyclooxygenase 2. Furthermore, the application of the serum was able to rescue the loss of involucrin and filaggrin induced by PM or PM+UV ranging from 23% to 38%.

Conclusions: The serum demonstrated protective benefits against oxinflammatory markers of skin damage and was able to prevent PM- or PM+UV-induced cutaneous barrier changes.