

# Effect of a quality-controlled fermented nutraceutical on skin aging markers: An antioxidant-control, double-blind study

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The aim of the present study was to determine whether oral supplementation with a fermented papaya preparation (FPP-treated group) or an antioxidant cocktail (antioxidant-control group, composed of 10 mg trans-resveratrol, 60 µg selenium, 10 mg vitamin E and 50 mg vitamin C) was able to improve the skin antioxidant capacity and the expression of key skin genes, while promoting skin antiaging effects. The study enrolled 60 healthy non-smoker males and females aged 40-65 years, all of whom showed clinical signs of skin aging. The subjects were randomly divided into two matched groups, and were administered FPP or antioxidant treatment of a 4.5 g/day sachet sublingually twice a day for 90 days in a double-blind fashion. The parameters investigated were: Skin surface, brown spots, skin evenness, skin moisturization, elasticity (face), redox balance, nitric oxide (NO) concentration, and the expression levels of key genes (outer forearm sample). As compared with the baseline (day 0) and antioxidant-control values, FPP-treated subjects showed a significant improvement in skin evenness, moisturization and elasticity. The two treatments improved the MDA and SOD skin concentrations, but only the FPP-treated group showed a higher SOD level and a significant NO increase, along with significant upregulation of aquaporin-3 and downregulation of the potentially pro-aging/carcinogenic cyclophilin-A and CD147 genes ( $P < 0.05$ ). Progerin was unaffected in both treatment groups. In conclusion, these findings suggest that orally-administered FPP showed a consistent biological and gene-regulatory improvement in the skin, as was also demonstrated in previous experimental and clinical trials testing other tissues, while common oral antioxidants had only a minor effect.

**Keywords:** antioxidant defence; fermented papaya preparation; gene expression; photoaging; skin aging; skin elasticity; skin moisturization

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