Eggshell membrane application and ingestion improve skin elasticity

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Introduction/Background

Aging lowers the type III / type I collagen ratio of the skin ECM \cite{1} and reduces the elasticity \cite{2}. Repeated mechanical stimulation beyond the homeostasis range may cause skin fibrosis. Changes in the physical properties of the skin affects the physical performance. The eggshell membrane supplementation has been utilized for a couple of decades. Our previous study shows moderate amount of solubilized eggshell membrane (SESM) let human skin fibroblasts (HDF) produces a young ECM environment in in vitro experiments that mimic in vivo \cite{3}. Here we report the effect of applying eggshell membrane cosmetic products or ingesting eggshell membrane supplements for skin elasticity.

Methods

Fourteen healthy volunteers (all females), age range 22-54 years, participated. Seven SESM and seven control subjects were randomized to 12 weeks of supervised application of 1\% or 0\% SESM in vehicle to arm skin. Separately, thirty healthy volunteers (age range 21-68 years), participated for supplement experiment. Subjects are divided into three experimental group; ESM group and two
placebo groups. The skin elasticity was determined using skin biophysical techniques, Cutometer® MPA 580, from Courage+Khazaka (Cologne, Germany).

Results

To evaluate the skin elasticity after topical application of SESM and ESM intake, the mechanical property of the subject’s arm skin, the parameter R7 (biological elasticity) increased significantly at all measurements compared with before treatment. Parameter R5 (net-elasticity of the skin without viscous deformation) also increased significantly in the outer upper arm, inner upper arm, and inner forearm region compared to before application of 1% SESM lotion. In contrast, elasticity parameters of the skin were not affected at the control site. The results showed that the elasticity significantly increased (p<0.01) after 8-weeks ESM intake, compared with values before intake. Control placebo groups didn’t show any significant difference.

Conclusion

Eggshell membrane rejuvenated the skin elasticity of healthy people in both application and ingestion. Mouse ECM gene expression analysis showed rejuvenate the ECM environment of the dermal papilla layer by promoting the turnover of type III collagen, decorin and MMP 2, as in the results of HDF of the previous study. Eggshell membrane can be expected to improve physical properties.

REFERENCES