

Rose-derived stem cell exosomes for recalcitrant to treatment of seborrheic dermatitis with 3 months of follow-up: A case report

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Key Clinical Message:

Rose-derived stem cell exosomes can be a promising therapeutic option for severe recalcitrant seborrheic dermatitis. Their anti-inflammatory effects and epidermal barrier restoration potential suggest a valuable adjunctive treatment. However, further comprehensive randomized clinical trials are recommended for validation.

Introduction

Seborrheic dermatitis (SD) is a common chronic inflammatory skin disorder mostly affecting infants and young adults, with multifactorial and poorly delineated pathogenesis. Despite environmental triggers and several other factors, including fungal colonization by *Malassezia spp.*, the sebaceous gland activity, as well as immunosuppression, endocrine, neurogenic, and iatrogenic factors have also been postulated.

Treatment of SD is purposed to modulate sebum production and reduce skin colonization by *Malassezia spp.*, while controlling inflammation. In mild-to-moderate cases, topical treatments represent the primary therapeutic approach. Whereas, the off-label use of some topical and systemic drugs, as well as physical treatment with UVB phototherapy, may be considered in severe and/or recalcitrant cases.¹

Exosome treatment is a recently developed cell-free therapeutic strategy due to its small size, biological origin, lipid bilayer membrane, ability to communicate intracellularly, and capacity to modulate molecular activities of the recipient cell. In particular, exosomes from mesenchymal stem cells (MSCs) are highly immunomodulatory with therapeutic effects, such as wound healing, prevention of scar, skin pigmentation, wrinkles², and improvement of chronic inflammatory skin disorders, e.g., systemic lupus erythematosus, bullous pemphigoid, and atopic dermatitis (AD).^{2, 3}

There was a study on topical application of human adipose tissue-derived mesenchymal stem cell (MSC)-derived exosomes (ASCEs), which yielded the effective treatment of dupilumab-related facial redness (DFR) in AD patients.⁴ Additionally, the ASCEs led to a shorter recovery time with fewer side-effects and better results of treatment when utilized in combination with fractional CO2 laser for acne scar treatment.⁵

Another study isolated exosome-like nanoparticles derived from rose stem cell culture media by the proprietary EV isolation technology to characterize and profile Rose Stem Cell Exosomes (RSCEs) with multiple biological effects on the skin, such as RSC in culture-released RSCEs. It was found that RSCEs contain microRNA and proteins of multiple biological functions in skin-related assays, e.g., fibroblast growth and melanin content in melanocytes. In addition to its anti-inflammatory function, RSCEs also increases the

production of exosome-like nanoparticles by inducing the stimulation of the mesenchymal stem cell for skin quality improvement.⁶

Case report

A 40-year-old man with severe recurrent seborrheic dermatitis since teenager was treated with topical corticosteroid (mometasone, 0.02% triamcinolone acetonide), topical calcineurin inhibitor, oral antihistamine, and anti-inflammatory moisturizer for 10 years with partial response and recurrence. During his flare-up condition, he occasionally received short course of oral prednisolone.

To alleviate the symptom of SD, a novel therapeutic option with 2.5 ml of exosome (ASCE + SRLV-S (ExoCoBio Inc., Seoul, Republic of Korea), containing 20 mg of lyophilized RSCEs, was applied to the entire face and electroporation (Dermashock Cool, Aestech USA California, USA) as an increasing trans epidermal drug delivery system of exosomes.

For post procedural treatment regimens, topical moisturizer containing exosomes was applied on the entire face twice daily for 21 days, with the night-time maintenance for 3 months. The moisturizer had RSCEs (Exobalm, ExoCoBio Inc., Seoul, Republic of Korea) with ingredients of lyophilized capsules of 2.5 billion particles, growth factors, peptides vitamins, and minerals, mixed with moisturizer cream of tranexamic acid, madecassoside, and d-panthenol niacinamide.

The clinical manifestations, e.g. redness, scaling, and itching, were improved on the first day after treatment. During his 3 months of follow-up, the patient had no disease flare-up and received no additional treatment. **(Figure 1 A-C)**

Discussion

The novel therapeutic option of RSCEs potentially revealed an immediate improvement after the first few treatment sessions with the mechanism of anti-inflammatory effect and restoration of epidermal barrier functions. It could be related to the contents of RSCEs, such as microRNA and proteins, which induce the increase in anti-inflammatory factors.⁷ Moreover, there are other active ingredients for inflammatory skin condition, including skin barrier repair property (sebum, squalene and ceramide), anti-inflammation (madecassoside and niacinamide), better wound healing process (D-panthenol), and whitening effect (niacinamide, hydroxyphenyl propamidobenzoic acid and tranexamic acid).

Conclusion

RSCEs can potentially be a promising therapeutic agent for recalcitrant SD, attributable to its anti-inflammatory properties and the capacity to restore optimal epidermal barrier functionality. However, it is advisable to undertake more extensive randomized clinical trials as both monotherapy and adjunctive treatment.

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