

## Remarkable findings in male pattern baldness: sugar molecule 2dDR offers hope for hair regrowth

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Dear Madam, Hair-loss, particularly androgenic alopecia (AGA) currently plagues over half the population worldwide<sup>1</sup>, affecting their self-esteem. Alarming, hair-loss has doubled in the paediatric population with trends only increasing among younger individuals.<sup>2</sup> The lack of approved, evidence-based, cost effective and low side-effect therapies has led people to social media platforms like TikTok, where they experiment with natural remedies like rosemary oil and rice water which lack standardisation and may do more harm than good.<sup>3</sup> It is therefore imperative to find more painless and affordable solutions to hair loss for which 2dDR-SA (2-deoxy-D-ribose sodium alginate) hydrogel may offer hope.

Currently there are only 2 FDA approved therapies for androgenic alopecia: topical Minoxidil and oral finasteride of which finasteride is contraindicated in premenopausal women and classified as pregnancy category X. However, there are multiple therapies being used off-label to treat AGA, with varying efficacies, delivery mechanisms, safety profiles and price points. Oral therapies include minoxidil, dutasteride, spironolactone, flutamide and bicalutamide, and cyproterone acetate. While topical therapies include clascoterone and pyrilutamide. In-office treatments such as low-level light therapy, intradermal botulinum toxin, dutasteride mesotherapy, platelet-rich plasma (PRP), mesenchymal stem cells exosomes and microneedling can be quite expensive, require multiple sessions and may cause pain.<sup>4</sup> For patients troubled by the side effects, low efficacy or priciness of these therapies, the discovery of 2dDR-SA hydrogel presents a potentially low-cost alternative.

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**Submission complete:** 09-09-2024 **First Revision received:** 04-12-2024

**Acceptance:** 22-01-2025 **Last Revision received:** 21-01-2025

### AUTHORS' CONTRIBUTIONS:

**FML:** Writing original draft, reviewing, editing, idea acquisition, final approval and agreement to be accountable for all aspects of the work.

What started off as experimentation with 2dDR for the purposes of wound healing due to properties similar to vascular endothelial growth factor (VEGF), resulted in intriguing findings of hair regrowth at the wound site. This prompted Anjum et al. (2024) affiliated with COMSATS University in Islamabad to explore this mechanism further by preparing a hydrogel comprising 2dDR, sodium alginate, and other stabilisers to release the sugar slowly onto mice. These mice had been injected with testosterone to mimic AGA and showed positive results after 21 days. The 2dDR-SA hydrogel-treated mice showed a similar level of hair regrowth as the minoxidil control group accompanied by observations such as increased hair follicle density and length, stimulation of angiogenesis, and enhanced melanin synthesis. The working hypothesis is that 2dDR stimulates VEGF and thereby, angiogenesis, promoting new hair growth.<sup>5</sup>

This is a compelling hypothesis that sets a novel framework to conduct additional research on the clinical use of 2dDR for AGA and proposes exploring other therapies that stimulate VEGF as potential treatments for alopecia.

**DOI:** <https://doi.org/10.47391/JPMA.21991>

**Disclaimer:** None.

**Conflict of Interest:** None.

**Source of Funding:** None.

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**ZM:** Writing original draft, reviewing, editing, final approval and agreement to be accountable for all aspects of the work.