

REVIEW

Therapeutic targets in the management of striae distensae: A systematic review

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Background: Striae distensae are permanent dermal lesions that can cause significant psychosocial distress. A detailed understanding of the numerous treatment modalities available is essential to ensuring optimal patient outcomes.

Objective: Our objective was to evaluate and summarize the different treatment methods for striae distensae by linking their proposed modes of action with the histopathogenesis of the condition to guide patient treatment.

Methods: A systematic review of the literature was performed with no limits placed on publication date. Relevant studies were assigned a level of evidence by the authors.

Results: Ninety-two articles were identified, with 74 being eligible for quality assessment. The majority of treatments aim to increase collagen production. The use of vascular lasers can reduce erythema in striae rubrae by targeting hemoglobin, whereas increasing melanin through methods such as ultraviolet light is a major focus for treatment of striae albae. Despite some topical treatments being widely used, uncertainty regarding their mode of action remains. No treatment has proved to be completely effective.

Limitations: Limitations of the study include low-quality evidence, small sample sizes, and varying treatment protocols and outcome measures, along with concerns regarding publication bias.

Conclusions: Further randomized, controlled trials are needed before definitive conclusions and recommendations can be made. (J Am Acad Dermatol <http://dx.doi.org/10.1016/j.jaad.2017.02.048>.)

Key words: management; stretch marks; striae albae; striae distensae; striae rubrae; systematic review; therapy; treatment.

Striae distensae (SD), also known as stretch marks, are common, permanent dermal lesions that can be symptomatic and are considered aesthetically undesirable; thus, they pose a significant psychosocial and therapeutic challenge. SD arise in areas of dermal stretching and most commonly occur on the abdomen, breasts, buttocks, and thighs.¹⁻³ Most literature has described SD during pregnancy (striae gravidarum) and puberty, with reported prevalences varying from 11% to 88%.^{1,2,4-7} Hormonal influences,⁸⁻¹² reduced genetic expression of fibronectin, collagen, and elastin,^{13,14} and mechanical stretching of the skin^{2,15-17} have all been postulated to contribute to SD formation. In the acute

phase, SD appear as red/violaceous lesions (striae rubrae; SR) that can be raised and symptomatic.¹⁸ The chronic form (striae albae; SA) exists as hypopigmented dermal depressions.^{18,19}

Because of their high prevalence and impact on patients' quality of life,²⁰ there is great demand for an effective treatment. A vast array of treatment modalities have been investigated, ranging from topicals¹⁹ and acid peel treatments²¹ to more invasive methods such as laser therapy.²² Although complete eradication of SD is not attainable, improving the appearance whilst reducing physical symptoms certainly is. It is therefore essential that clinicians managing SD have a detailed understanding of available treatment

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strategies to optimize patient outcomes and expectations.

We herein present a systematic review of SD, focusing on the different treatments and their proposed modes of action with outcomes, in relation to the histopathogenesis of the condition.

METHODS

Searches of both PubMed/Medline and Scopus were conducted using the key words “stretch marks,” “striae distensae,” “striae rubra,” “striae alba,” and “striae gravidarum” AND “management” OR “treatment.” No limits were placed on publication date. Citations of articles were also reviewed. Exclusion criteria consisted of animal/in vitro studies, non-English language articles, unavailability of full text, book chapters, conference papers, letters, and reviews not specific to SD.

Data including treatment protocols, number of participants, and striae type were extracted. Relevant articles were assigned a level of evidence (LOE) independently by the authors, based on a quality rating scheme modified from the Oxford Centre for Evidence-Based Medicine for ratings of individual studies (Supplemental Table I; available at <http://www.jaad.org>). The risk of bias was assessed at both study and outcome levels.

RESULTS

Ninety-two articles of the 383 initially identified were included for analysis (Fig 1). Seventy-four publications, representing 2328 patients, were relevant for quality assessment and assigned an LOE, the results of which are as follows: level 1, 15 (20.3%); level 2, 31 (41.8%); and level 4, 28 (37.8%).

Histopathogenesis

SD were first histologically described in 1889,²³ with SR and SA being histologically distinct from each other (Fig 2).²⁴⁻³² They exhibit abnormalities in 3 core components of skin that normally provide it with tensile strength and elasticity: collagen, elastin, and fibrillin.²⁵⁻²⁹ Early changes associated with SR include accumulation of degranulating mast cells and macrophages around mid-dermal elastic fibers, resulting in elastolysis.²⁴ These changes may be seen in macroscopically normal skin up to 3 cm away

from the lesion.²⁴ As the striae progress to form SA, there is gradual epidermal atrophy with loss of rete ridges.^{24,25}

Treatment

Enhanced collagen production. The vast majority of treatments were targeted toward stimulating collagen production (Supplemental Table II; available at <http://www.jaad.org>, and Fig 3).

Topical agents. Tretinoin (retinoic acid) is believed to increase tissue collagen I levels through stimulation of fibroblasts^{19,33} and has inhibited activation of matrix-degrading enzymes after ultraviolet (UV)-induced skin damage, which implies that it may also protect the skin from other mechanisms of injury.¹⁹ Numerous studies have investigated its efficacy

(LOE 1, 2, 4),³³⁻³⁷ with the majority suggesting that it can improve the appearance of early SD but not at lower doses.³⁵ However, study populations were small, and common side effects included transient erythema^{19,33,34,36,37} and scaling of the skin.^{19,33,34,36}

Centella asiatica is a plant used in Asian herbal medicine. It contains asiaticoside, which stimulates fibroblasts, with antagonistic effects on glucocorticoids also described.³⁸ Its use in the prevention of striae gravidarum has been investigated, with reported reductions in the development and severity of striae (LOE 1).³⁸ No side effects were observed. The use of Centella asiatica combined with boswellic acid, previously found to have anti-inflammatory effects, has also been tested.³⁹ Reductions in striae severity were noted; however, side effects included pruritus (LOE 4).

Hyaluronic acid is also thought to increase collagen production through stimulation of fibroblasts.⁴⁰ Two randomized, controlled trials (RCTs) (LOE 1) have reported improvements in the appearance of striae after its use, with a reported side effect being pain after treatment.^{40,41} No follow-up was conducted, and both incorporated subjective assessments of their outcome measures.

Chemical peel treatments. Chemical peel treatments involve the application of trichloroacetic acid or glycolic acid (GCA). They are thought to induce an initial inflammatory response, with subsequent increased collagen production.^{21,42} A non-randomized, controlled trial investigating GCA

CAPSULE SUMMARY

- Striae distensae are extremely common, permanent dermal lesions. There is great demand for an effective treatment option.
- The majority of treatments aim to increase collagen production, reduce erythema, or increase pigmentation.
- Despite some positive outcomes, definitive recommendations cannot yet be made because of a lack of high-quality evidence.

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