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CLAIMANT MEDICINAL PLANTS IN MANAGEMENT OF STRETCH MARKS: A REVIEW ROOTED ON CLINICAL EVIDENCES

Bhavya Agarwal[1], Parkhi Rastogi*[1], Virender Pal Kaur[2], Urvashi Sharma[2], Mayank Tyagi[3], DivyanshDutt Kaushik[3], Karina Chaudhary[4],Vikrant Verma[3]

[1]Department of Pharmacology, Faculty of Pharmacy, Swami Vivekanand Subharti University, Meerut (U.P) INDIA -250005

[2]Faculty of arts and social sciences, Swami Vivekanand Subharti University, Meerut (U.P) INDIA -250005

[3] Department of Pharmaceutical Chemistry, Faculty of Pharmacy, Swami Vivekanand Subharti University, Meerut (U.P) INDIA -250005

[4] Translam Institute of Pharmaceutical Education and Research

Corresponding Author

Parkhi Rastogi, Email.ID: rastogi.parkhi@gmail.com

ABSTRACT:

Striae distensae (striae) are cutaneous lesions that have gravely troubled the mental health and quality of life. Conventional therapies are being used to manage and prevent stretch marks. However, these therapies are not entirely effective and no one has been reported to have fully reversed the striae and recovered the normal appearance of skin. Worldwide, numerous medicinal plants were utilized for preventing striae distensae due to presence of great chemical components in various ancient system of medicine. Medicinal plants with anti-stretch mark property are being more desired, owing to more potency and effectiveness. The review focuses on various plants that have been reported to be effective in reducing and preventing stretch marks. This includes Centella asiatica, Aloe vera, Croton lechleri, Rubia cardifolia, Curcuma domestica, Lagerstroemia indica, Chrysopogonzizanioides, Olea europaea etc. All of them have shown a certain degree of anti-stretch mark activity by different mechanism of action.

Key Words: Striae distensae, striae rubrae, striae albae

INTRODUCTION:

Striae distensae (SD) are cutaneous lesions which are initially pink to violaceous and at later stage the lesion mature into white, crinkly streaks that majorly developed during pregnancy and cause the epidermis to atrophy and become flatten. Up to 90% of women get striae gravidarum (SG), or stretch marks that appear during pregnancy. Along with its aesthetic effects, SG has the potential to cause psychological and emotional suffering, and can degrade quality of life. Striae gravidarum (SG) associated with stretch marks which specifically occur during pregnancy. Striae distensae (SD) occurs from numerous and varied causes, some primary ones are gaining weight, pregnancy, excessive corticosteroid levels, growth spurts and genetic predispositions refers to stretch marks from various causes, including pregnancy, weight gain, obesity, growth spurts and corticosteroid excess. Striae rubrae are the earliest kind of striae lesions which begins to pinkish or violet in color and may also be erythematous. Striae albae are permanent striae, which transformed by striae rubrae due to decreased melanization and appear as white lines. Striae rubrae lesions gradually atrophied and transform into striae albae. (1)

Stretch marks, striae, and striae distensae (SD) are some of the most prevalent cosmetic issues brought on by the dermal loss of collagen and elastin fibres. There are many factors which plays pathogenic role in stretch marks, such as mechanical tension due to which dermal connective tissue breakdown and leads to lack of strength and elasticity of the skin. (2). Lack of elasticity and tensile strength are the main pathogenesis of stretch marks. Along with that, some other factors like endocrine imbalance, toxins are also considered to be responsible for striae production. (3)

Nuraini&Rahayu, 2021, stated other mechanical factors engaged in the striae formation, such as development of subcutaneous structures (interstitial adipose tissue). Striae are indented lines usually appears on the buttocks, thighs, back, abdomen, breasts, axillae, and groin area. Biochemical factors results in inhibition of fibroblast activity and decreased proliferation due to the higher amount of glucocorticoids.(4) Some research revealed that another factor of Striae distensae is degradation of ECM (Extracellular matrix) which can occur due to mast cell granulation despite formation of ECM by fibroblasts. (5)

PREVALENCE: SD is more prevalent in women than in males, with a prevalence of 11%-88% in the general population. Stretch marks and hyperpigmentation are two skin abnormalities that affect about 90% of women. (2,4). According to research studies, the adolescent population affected with stretch marks reportedly ranges from 6% to 86% (6). Moreover, the prevalence of striae gravidarum (striae occurs specifically during pregnancy) is 75% in pregnant women worldwide. (7). Obese people with 25-61 body mass index (BMI) reported stretch mark prevalence of 43%. (8)

QUINTESSENCE

An illustration of Striae distensae causes and types with characteristics of striae rubrae and striae albae are shown in figure1, which demonstrate that there are various mainspring of Striae distensae such as pregnancy, obesity, chronic steroid use, adolescence, cushing's syndrome, family history and many more. Striae rubrae are considered as an early form of Striae distensae and are red, erythematous, vaguely raised, linear lesions which is considered as temporary striae, where as Striae albae are pale, wrinkled, atrophic, albae and are considered to be the permanent striae.

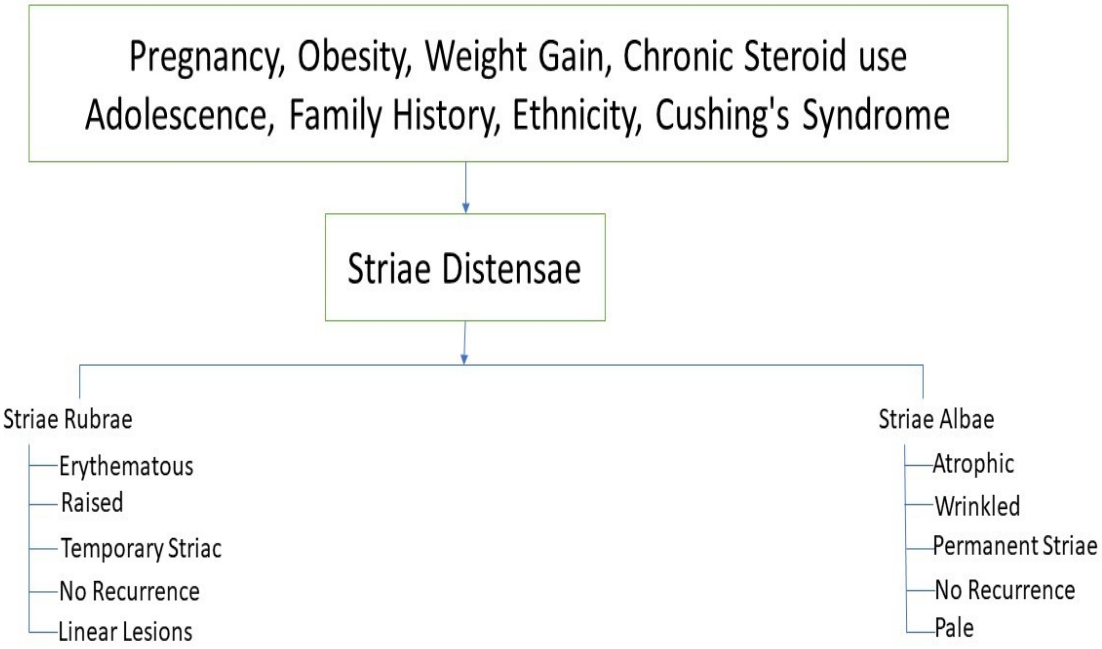

Figure 1 Diagram of Striae distensaecauses and types.

TREATMENT: *SD treatment options have not yet been acknowledged. We found scant evidence in the literature to support the claims that centella and/or massage with bitter almond oil can prevent SG and/or lessen their severity. Weak data supports hyaluronic acid's prevention of SG. Tretinoin has the potential to lessen the severity of newly developed SG, however its use is constrained by its pregnancy classification. (1, 9) Although there are several therapeutic options for SD, there is still no gold standard therapy for this condition. Most promising and current treatment for striae is divided into three categories: single therapy, therapeutic comparisons, and combination therapy. Review concluded that combining two or more modalities together is typically preferable in combination therapy than using each one separately. Also, topical therapies, lasers, and other light-based devices are the most often used interventions in the*

single therapy category and shows significant textural and pigment correction with minimal side effects. Single therapy modalities which seem very effective include carboxytherapy, fractional photothermolysis (for all types of striae), tripollar RF (mainly for dark skin phenotype), microneedling etc. Moreover in therapeutic comparison, different modalities show equally beneficial effect and little variation in terms of length of treatment and adverse events. (2, 10) Stretch marks treatment based on elevating the amount of collagen and elastin in the skin. (4, 11)

MEDICINAL PLANTS APPOSITE STRIAE DISTENSAE:

1. ***Centella asiatica*** **(Gotu kola)**

Figure 2: Centella asiatica

According to research studies (Quasi-Experimental), *Centella asiatica* was tested on 12 participants (postpartum mothers, day 0-6) having stretch marks, carried out at the Independent Practice Midwife (IMP) ZummatulAtika. Paired T-test result indicates significant difference in striae gravidarum particularly in terms of skin moisture and texture, after and before using a lotion containing Gotu kola extract. Stretch marks took between 6 and 10 months to go from dark to light, turn white (alba), and flatten out. Stretch mark lines decreased from 5–10 (pre–test) to 1–5 (post–test). (4) In accordance to a study, gotu kola contains glyceryl to moisturize the skin and sodium lauryl sulphate (SLS) to remove filth. (12) A review of the literature revealed that massage with bitter almond oil and Centella asiatica could both prevent and lessen the severity of SG (Striae Gravidarum). (1) Moreover, skin hyperpigmentation and stretch marks can be treated by oral supplementation of Gotu Kola by elevating skin's collagen production and keeping the skin moistened. (13).

2. ***Aloe Vera*****(Gwar Patha or Ghrit Kumari)**

Figure 3: Aloe Vera

The Aloe Vera plant has stiff lance-shaped gray-green leaves with a mucilaginous pulp and people have known this from ages for its therapeutic and skin-care benefits. The plant have extraordinary capacity to accelerate the production of fibroblasts cell by 6-8 times higher than normal and to generate collagen and elastin fibres, which make the skin more elastic and less wrinkled, aloe offers tremendous anti-aging effects. (14) In double-blind clinical trial, 160 nulliparous women were included and the study's variables (itching, erythema, and spread of striae) were examined using statistical tests in SPSS after dividing women randomly into 4 groups, from which 1,2,3 groups were treated with 700 g Aloe Vera, sweet almond oil, and base cream. Whereas, 4^{th} group(control group) was treated with only base cream. Result revealed that tested aloe vera cream was able to reduce itching, erythema and treat stretch marks ($p<.05$); as compared to the control group. (15) Mucopolysaccharides present in aloe vera aids in retaining moisture of the skin. (3)

3. Punica Granatum (Pomegranate)

Figure 4: Punica Granatum

In a non- randomized in-vivo study, 20 healthy women of age 21-48 years were choosed with the aims to observe the difference at epidermis and dermis level in test group and control group. Test group was given an emollient oil-in-water cream which is formulated from C. lechleri resin extract and *Punica granatum* seed oil. Result revealed elevated elasticity, thickness of dermal layer, stimulates keratinocyte proliferation and boosted hydration due to presence of punicic acid, cyanidin and some flavonoids in *Punica granatum*. Hence, it is found to be useful in improving and preventing striae distensae. Some studies suggested that P. granatum seed oil is beneficial and exhibit anti-aging effect, antioxidant and anti-inflammatory activity. (16, 17)

4. *Croton lechleri* (dragoblood)

5. Figure 5: Croton lechleri

In a non- randomized in-vivo study, 20 healthy women of age 21-48 years were choosed with the aim to observe the difference at epidermis and dermis level in test group and control group. Test group was given an emollient oil-in-water cream which is formulated from *Croton lechleri* (Dragon's blood) resin extract and P. granatum seed oil. Result suggested *Croton lechleri* can be used to prevent striae as it boosts collagen production, regenerate epithelia and stimulates fibroblasts proliferation and migration due to the presence of constituents like; proanthocyanidins, taspin and principal alkaloid catechin. Previous research revealed Croton lechleri potential as antioxidant, anti-inflammatory and healing properties. (17)

6. *Rubia cardifolia* (manjistha)

Figure 6: Rubia cardifolia

In a randomized trial, 30 females were taken up for the study. Stretch marks were observed before trial then ManjisthaGhrita was given for 30 consecutive days. After 30 days of study, females were examined for changes in kikkisa(Striae gravidarum). The result data was interpreted statistically using Paired T test, Wilcoxon test, by using SPSS Software. The obtained data revealed that *Rubia cardifolia*possess anti-stretch mark activity by promoting collagen formation. Previous literature states that Manjistha is widely used in cosmeceutical industry as it have Ropana- Sothahar property, kandughana, vishghana, pittashmak property and beneficial in skin burning, improving skin texture , itching and hypopigmentation. (18, 19)

7. Curcuma domestica (turmeric)

Figure 7: Curcuma domestica

Bingan E.C.S., conducted research trial on Garbhini (pregnant women) with pre-test and post-test of striae. Study design include two groups: one control group, which receive placebo treatment and other test group receive turmeric hydrogel. Result analyzed statistically by using ANOVA. The interpretation of data conclude significant change in reduction of kikkisa (Striae Gravidarum) in turmeric hydrogel treated group (p-value = 0.004) but no change in color of striae in comparison to the control group. (20, 21)

8. *Vitellaria paradoxa* (shea tree)

Figure 8: Vitellaria paradoxa

Shea butter was prepared from the tree *Vitellaria paradoxa.* Shea butter contains vitamin A naturally, which makes it suitable choice for using in curing stretch marks, hydrated skin, healing properties and reducing scars. Additionally, Shea butter works by smoothening and softening of skin by modifying cellulite appearance. (22) Shea butter is advisable for both prevention and treatment of kikkisa (Striae gravidarum). It keeps the skin hydrated, maintain and regain elasticity and firmness of the skin during pregnancy, which ultimately prevent stretch marks to appear and also reduce them if used after childbirth. (23)

9. *Lagerstroemia indica* (saoni)

Figure 9: Lagerstroemia indica

In India, Lagerstroemia indica flower (LIF) has been widely used as diuretic. Research conducted on Lagerstroemia indica flower extract (LIFE) to identify the possible mechanism behind stretch mark treatment. Result revealed that *Lagerstroemia indica* extract is beneficial cosmetic agent on alleviating striae distensae as it promotes synthesis of extracellular matrix (ECM) in fibroblasts and suppresses the fibronectin -induced mast cell activation. Moreover, LIFE suppresses RBL-2H3 on fibronectin (FN) and attenuated the allergen-induced granules. (5, 24)

10. *Tasmannia lanceolata* (mountain pepper)

Figure 10: Tasmannia lanceolata

Twenty nine (29) females were taken out for a randomized, double blind clinical trial for evaluating the *Tasmannia lanceolata* extract effect in treating striae distensae. For 8 consecutive weeks, placebo and plant extract were given in different groups of women ranging in age from 25 to 60. Stretch marks and skin firmness was measured using 2D and 3D image processing and analysis. Result of study reported significant improvement in skin firmness, dermal density, and skin roughness after 8 weeks of treatment in *Tasmannia lanceolata* extract (TLE) group when compared to the control group. Therefore, plant extract restored the healthy skin conditions and reduce striae. In some studies, TLE also increase collagen content (pro-collagen I) and elastin fibres, which could be the mechanism behind TLE's anti-stretch mark activity.(25)

11. *Chrysopogonzizanioides* (Vetiver, khus)

Figure 11: Chrysopogonzizanioides

Vetiveriazizanioides, also known as vetiver or khus, is grass which uncontrollably grows in periodically flood inundated tracts, of western and north-central India. Through the process of steam distillation, the essential oil is collected from the roots, which aids in the replacement of dead and discolored tissues in the damaged areas with new tissues, giving the area a more uniform appearance. Furthermore, *Chrysopogonzizanioides*founds useful in stretch marks after childbirth, scarring and fat cracks. (26

12. *Olea europaea* (olive)

Figure 12: Olea europaea

The aim of this study is to investigate the clinical efficacy of *Olea europaea* in prevention and reduction in stretch marks (SG) by using Fitzpatrick Skin Type Scale and Davey's Severity Score. In this randomized controlled trial, 156 Turkish pregnant females were randomly assigned during their last trimester for the trial and separated into intervention group and control group. Olive oil was applied to test group women, two times a day on abdomen and control group applied placebo. The females' striae severity (incidence and type) were considerably decreased in intervention group compared to control group. Moreover, the level of incidence of striae gravidarum in the test group is 50% and in control group is 69.2%. Davey's Severity Score of test group is 2, which is less severe than control group score i.e. 4 (more severe). Hence, indicates that olive oil is clinically efficient to treat and prevent the progression of stretch marks. (27, 28)

13. *Ginkgo biloba* (maidenhair trees)

Figure 13: Ginkgo biloba

According to research studies, Ginkgo shows tremendous effects when used with honey, turmeric and ginseng on the appearance of skin like fine lines, wrinkles, ageing signs and also helps in hydration to reduce dryness of the skin. Additionally, *Ginkgo biloba* belongs to Ginkgoaceae family and contains high amount of vitamin E due to which the plant is extremely useful in reducing striae distensae, acne, scars and pimples. Ginkgo is another name of *Ginkgo biloba* tree which is native to china and keeps skin young, healthy and hydrated. Ginkgo also act as antioxidant and protects the nervous system (29)

*14. Ximenia Americana (*Hog plum)

Figure 14: Ximenia Americana

The wild plum,or*Ximenia americana L.*, is a tiny evergreen tree in the Olocaceae family, which blooms all around the year and is originated in tropical Africa, and is currently found in many locations including the Western Islands, New Zealand and south America. It can withstand droughts and thrives in rocky soil. However, the oil extracted from *Ximenia Americana* tree's seeds is the most valuable component which is widely used by locals in southwest Angola, mostly as a cosmetic for the skin—to moisturise, smooth, promote skin elasticity, reduce appearance of kikkisa (stretch marks in pregnant female), and condition hair. (30)

15. *Berberis aristata*(Dāruhaldhi)

Figure 15: Berberis aristata

The study intended to evaluate the clinical efficacy of *Berberis aristata*in preventing kikkisa. The trial is based on comparing two plants Daruharidra and Yashtimadhu gel activity on striae gravidarum. The research is completely based on signs of Rekha Swarup TwakSankoch (stretch marks present on abdominal wall), Kandu (Itching), Daha (burning sensation), and Vaivarnya (discolouration). A conclusion was reached after careful observation and analysis that Daruharidra and Yasthimadhu are potent medicinal plants used to protect and treat the skin due to their antimicrobial, antibacterial, as well as wound-healing, characteristics. *Berberis aristata*could be the choice of plant to prevent striae gravidarum. (31)

16. *Glycrrhiza glabra* (mulethi)

Figure 16: Glycrrhiza glabra

The study design involves local application of combination gel (Daruharidra and Yash-Timadh) on given group of women (24-36 weeks pregnant) twice a day and followed up after every 15 days till delivery. According of Acharya vagabhata, gel formulation composed of *Glycrrhiza glabra andBerberis aristata* works efficiently in preventing kikkisa by stimulating collagen production. Comparing and statistically analyzing the parameters like Kandu (Itching), *Daha*(Burning), *Vaivarnya*(Discoloration), and Stretch marks (No. of striae) , before and after the treatment with gel formulation. Result revealed 100% efficiency in itching and burning, 29% in discoloration and 3% on number of striae gravidarum. (31)

17. *Rosa canina* (Dog rose)

Figure 17: Rosa canina

Rosehip is known to be a pseudo fruit of the plant *Rosa canina,* which is found in Eurasia. Previous investigation revealed that rosehip has been used in food manufacturing, especially in herbal tea due to the presence of vitamin E and ascorbic acid in high amount. Additionally, rosehip is enriched in carotenoids and phenols along with vitamin C, which indicate its antioxidant activity. Rosehip is used topically for the management of striae distensae. (32)

18. *Carthamus Tinctorius* (Safflower)

Figure 18: Carthamus Tinctorius

Many parts of the plant *Carthamus Tinctorius* like, seeds, flowerare widely utilized as medicine as anti-pyretic, anti-diabetic, analgesic, anti-neoplastic, boost hair growth, promote weight loss and cure breathlessness. Additionally, *Carthamus Tinctorius* seed oil has been reported to manage stretch marks and lessen scars, when applied topically to the skin. (33)

19. *Prunus dulcis* (Almond)

Figure 19: Prunus dulcis

The clinical trial has been conducted on primiparous women who went to a pregnancy clinic in turkey. Three groups of participants were created: primiparous women applying bitter almond oil with massage (n = 47), primiparous women applying bitter almond oil without massage (n = 48), and primiparous women in the control group (n = 46). Result indicate significant difference among three groups, as 20% striae appeared in first group

female and 38.8% striae developed in female who applied almond oil without massage and 41.2% striae in control group. Hence, this study state the potent effect of bitter almond oil in preventing striae gravidarum, when applied topically with massage on the skin groups (34)

20. *Lupinus albus* (Lupin)

Figure 20: Lupinus albus

Research studies stated that Lupinus albus is clinically proven to increase collagen in the skin. In this, 28 womens were randomly selected for applying the topical formulation of Lupin seed extract and skin treatment oil(5ml) for about 12 weeks daily. The comparative study result showed that Lupin seed extract formulation improves the elasticity of skin by 16% in comparison to other oil and could be the choice of anti-stretch mark oils. (3)

21. *Calophylluminophyllum* (Tamanu, Indian-laurel)

Figure 21: Calophylluminophyllum

*Calophylluminophyllum*plant's various parts like leaves, fruit and seeds were utilized as traditional medicine for treating many illnesses. Mainly nuts and extracted oil were used for skin ailment. Many research studies revealed the potency of "Tamanu oil" for long time topical use for diminution of scars and management of stretch marks. It is well known that Calophylluminophyllum seed oil is used in formulae for renewing and safeguarding cosmetics, such as skin restorative and wrinkle or stretch mark prevention due to its mechanism of promoting proteins). Tamanu oil's resinous component is thought to be responsible for its bioactive qualities. (35)

LIST OF MEDICINAL PLANTS

S. No.	Plant Name	Family	Part of plant used	Therapeutic activity	Reference
1.	*Centella asiatica*	Apiaceae	leaves	Increased collagen production in the skin	4, 1, 12, 13
2.	*Aloe vera*	Asphodelaceae	Leaves	Moisturize skin and increase elasticity of the skin.	15,3
3.	*Punica granatum*	Lythraceae	seeds	Increase dermis thickness, hydration, and stimulates keratinocyte proliferation	16,17
4.	*Croton lechleri*	Euphorbiaceae	Bark	boosts collagen production, regenerate epithelia and stimulates fibroblasts proliferation	17
5.	*Rubia cardifolia*	Rubiaceae	Root and stem	Increase production of collagen	18,19
6.	*Curcuma domestica*	Zingiberaceae	Stem	Stimulate collagen synthesis and epithelium	20,21

				proliferation	
7.	*Vitellaria paradoxa*	Sapotaceae	Fruit (nut)	Keep skin hydrated and regain firmness	22,23
8.	*Lagerstroemia indica*	Lythraceae	Flower	Promotes synthesis of extracellular matrix (ECM) in fibroblasts	5,24
9.	*Tasmannia lanceolata*	Winteraceae	Leaves	Increase collagen content (pro-collagen I) and elastin fibres	25
10.	*Chrysopogonzizanioides*	Poaceae	Roots	Formation of new cells	26
11.	*Olea europaea*	Oleaceae	Fruit	skin-nourishing agent	27,28
12.	*Ginkgo biloba*	Ginkgoaceae	-	Keep skin hydrated	29
13.	*Ximenia Americana*	Olacaceae	Seeds	Boost elasticity of the skin	30
14.	*Berberis aristata*	Berberidaceae	Leaves and stem	Stimulate collagen synthesis	31
15.	*Glycrrhiza glabra*	Fabaceae	root	Stimulate collagen synthesis	31
16.	*Rosa canina*	Rosaceae	Fruit	Keep skin hydrated	32
17.	*Carthamus tinctorius*	Asteraceae	Flower and seed	Formation of new cells	33
18.	*Prunus dulcis*	Rosaceae	Fruit	Keep skin hydrated and moisturized	34
19.	*Lupinus albus*	Fabaceae	Seeds	Increase elasticity of the skin.	3
20.	*Calophylluminophyllum*	Calophyllaceae	Nuts	Stimulated both	35

				cell proliferation as well as collagen and GAG production	

CONCLUSION:

There are number of people who have striae distensae, especially females who experience it during pregnancy and after childbirth, which demands special attention towards its management. The therapies available for stretch marks includes expensive treatment (laser, micro needling etc.) with higher efficacy and cheaper (topical formulations) with lower efficacy. This systemic review based on most prevalent, recent, promising medicinal plants for management of stretch marks. Therefore, potent therapeutic formulations with anti-stretch mark activity are increasingly sought by patients. Many evidences support the effectiveness of conventional treatment; however it's important to keep in mind any potential safety concerns that could arise when using these medications. Finding an effective therapy is difficult despite a fundamental comprehension of the etiology and histopathological alterations that take place. The vast majority of therapeutic approaches aim to boost collagen synthesis, hydration, and increase elasticity of skin, proliferation of fibroblasts. We anticipate that this article will serve to further advance the development of this field and identify a new generation of natural anti-stretch mark therapies that will contribute to satisfying the growing consumer demand for treatments that are secure, long-lasting, and all-natural. To facilitate accurate comparisons between therapies, future study should concentrate on developing standard outcome measurements and treatment regimens.

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