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Botanicals and Anti-Inflammatories: Natural Ingredients for Rosacea

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Rosacea is a chronic inflammatory skin condition characterized by cutaneous hypersensitivity. There are many therapeutic options available for the treatment of rosacea, but none are curative. Since the pathogenesis of rosacea remains elusive, it is not surprising that no single treatment is paramount and that many patients find therapies unsatisfactory or even exacerbating. Treatments are prescribed to work in concert with each other in order to ameliorate the common clinical manifestations, which include: papules and pustules, telangiectasias, erythema, gland hypertrophy, and ocular disease. The most validated topical therapies include metronidazole, azelaic acid, and sodium sulfacetamide-sulfur. Many other topical therapies, such as calcineurin inhibitors, benzoyl peroxide, clindamycin, retinoids, topical corticosteroids, and permethrin have demonstrated varying degrees of success. Due to the inconsistent results of the aforementioned therapies patients are increasingly turning to alternative products containing natural ingredients or botanicals to ease inflammation and remit disease. Additional research is needed to elucidate the benefits of these ingredients in the management of rosacea, but some important considerations regarding the natural ingredients with clinical data will be discussed here.

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Rosacea is a chronic skin disorder characterized by cutaneous hypersensitivity and inflammation of the central facial skin. It is estimated rosacea affects 14 million people in the United States.[1] The typical presentation is that of a fair-skinned individual of European and Celtic origin with a variety of clinical features, including facial flushing and erythema, papules and pustules, telangiectasias, gland hypertrophy (phymatous changes), and/or ocular disease as demonstrated by conjunctival injection, blepharitis, stye formation, and/or keratitis.[2] Because of this clinical diversity, in 2002 the National Rosacea Society Expert Committee defined clinical subtypes to help classify rosacea on the basis of its primary features, with further clarification in 2004 of the common secondary features.[3,4] The classification of subtypes has helped dictate treatment protocols, as no treatments are curative. Specific subtypes respond better to one treatment than the other, but in all cases therapy requires long-term management with multiple concomitant interventions (Table 1).

For the erythematotelangiectatic (Fig. 1) and papulopustular (Fig. 2) subtypes, primary interventions include topical agents, such as azelaic acid, metronidazole, or sodium sulfacetamide-sulfur with or without an oral antibiotic, such as doxycycline, minocycline, or tetracycline.[5-7] Nonablative lasers, vascular lasers, and intense pulse light therapy are the cornerstones of treatment for telangiectasias and persistent erythema but are often associated with some short-term side effects, such as worsening redness or purpura (Fig. 3).[8-10] For phymatous disease, medical therapy includes isotretinoin; however, if advanced, only surgical interventions such as microdermabrasion, carbon dioxide laser, electrocautery, or surgical shave are beneficial, as this condition will not spontaneously resolve

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Table 1 Subtypes of Rosacea with Associated Characteristics and Suggested Therapies

Subtype	Characteristics	Interventions
Erythematotelangiectatic	Flushing and persistent central facial erythema ± telangiectasia	Flushing: trigger avoidance, ice chips in mouth/drinking cold water/cold compresses on face, clonidine, beta-blockers; nontransient erythema: topical metronidazole, azelaic acid, sodium sulfacetamide-sulfur; persistent erythema: laser (pulsed dye) and light modalities (intense pulsed)
Papulopustular	Persistent central faicla erythema with transient, central facial papules and/or pustules	Topical metronidazole or azelaic acid ± sodium sulfacetamide-sulfur; ± oral tetracyclines or low-dose oral isotretinoin
Phymatous	Thickening skin, irregular surface nodularities and enlargement; may occur on the nose, chin, forehead, cheeks, or ears	Oral isotretinoin ± pulse dye laser; advanced cases: surgical interventions (electrosurgery, cold steel excision, carbon dioxide, scalpel or shave sculpting)
Ocular	Foreign body sensation in the eye, burning or stinging, dryness, itching, photosensitivity, blurred vision, telangiectasia of the sclera or other parts of the eye, or periorbital edema	Good oral hygiene, warm compresses, artificial tears; ± oral tetracyclines; consider intraocular cyclosporine ophthalmic (Restasis)

Adapted from: Wilkin et al.[3] and Del Rosso et al.[88]

(Fig. 4).[11-13] Disease exacerbations will not improve without the patient's strict avoidance of triggers (caffeine, exercise, spicy food, alcohol, emotional stress, topical products that irritate the epidermal barrier, medications that induce flushing) and appropriate adjunctive skin care, such as gentle cleansers, moisturizers, and photoprotection.[14]

The incomplete understanding of the pathogenesis of rosacea makes treatment difficult and at times disappointing. It is known that inflammation plays a role because most interventions that modulate the inflammatory process are effective. However, factors that regulate and maintain this inflammatory dysfunction are poorly understood. Despite all the research on the development of rosacea and the underlying neoangiogenesis, pilosebaceous abnormalities, dermal matrix degeneration, and dysfunction of antimicrobial peptides, most therapies only target the signs and symptoms of the condition rather than the underlying cause.[15] Because each patient is uniquely sensitive both to triggers that stimulate disease and to standard therapies, an increasing number of patients are seeking alternative options.

Natural Ingredient Alternatives

Natural ingredients have been used worldwide for centuries in skin care as wound healing and antiaging remedies. Many new dermatologic products claim to contain "natural" ingredients—botanicals that are herbal in origin and found directly in nature—with beneficial claims of activity on aging and inflammation (Fig. 5). They provide alternatives for pa-

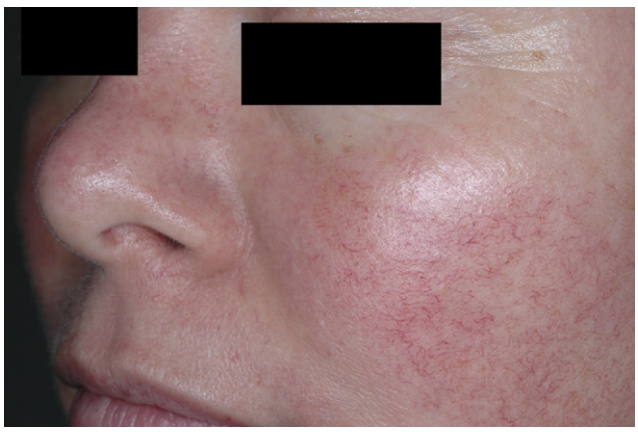

Figure 1 Erythematotelangiectatic rosacea of the left cheek. Note the centrally located facial flushing and telangiectasias with sparing of the periocular skin.

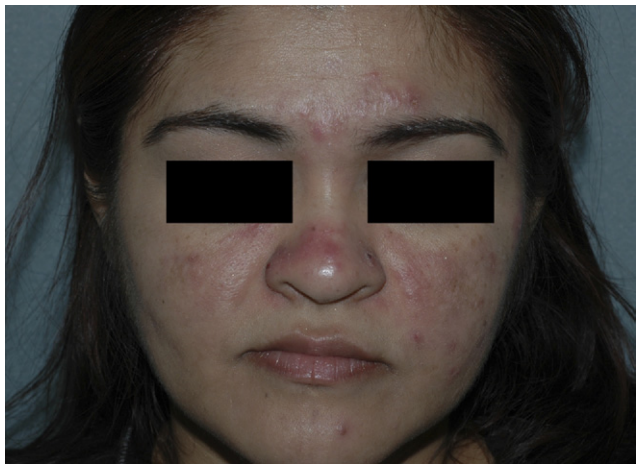

Figure 2 Papulopustular rosacea with predominately small erythematous papules and pustules.

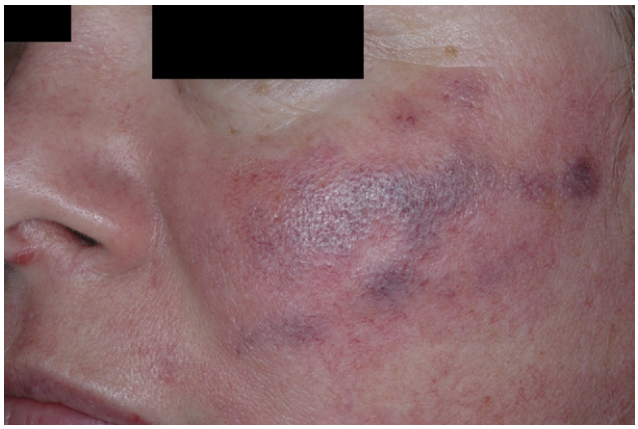

Figure 3 Erythema and purpura after pulsed-dye laser treatment of erythematotelangiectatic rosacea.

tients frustrated with standard prescription medications but may also be used to enhance the therapeutic effects or prevent the side effects of other medications. Because herbal and other alternative medical treatments are used by more than half the population in the United States, it is important that dermatologists have knowledge of common and popular botanicals used medicinally or for flavoring and/or fragrances.[16,17]

Large, clinically validated, placebo-controlled trials are lacking, most likely because medicinal botanicals used in cosmeceuticals are considered food additives or dietary supplements by the U.S. Food and Drug Administration (FDA) and can be marketed without maintaining any drug status or restriction. A high level of scrutiny is needed because most "natural" treatments have no standards in potency, concentration, safety, or efficacy. Despite many herbal remedies claiming dermatologic benefits, only colloidal oatmeal, niacinamide, feverfew, licorice extract, green tea, and coffeeberry have scientific literature suggesting a therapeutic advantage in the treatment of rosacea (Table 2). These products will be the primary focus of this paper, with a brief mention of other botanicals on the market.

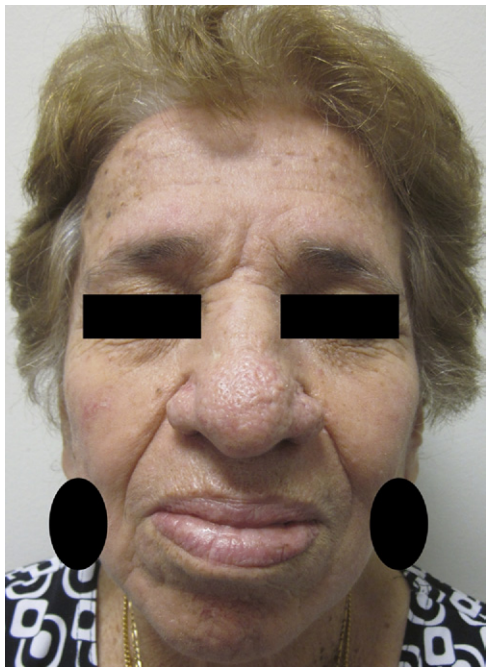

Figure 4 Phymatous rosacea is characterized by marked skin thickening and irregular surface nodularity.

Figure 5 Examples of products containing natural (botanic) ingredients, such as soy, oatmeal, niacinamide, vitamins, and minerals.

Hydrating

Colloidal Oatmeal

Colloidal oatmeal has a long-standing history of benefit in dermatologic conditions associated with itch and irritation because of ability to soothe and protect inflamed skin. It contains a variety of active components, including polysaccharides, proteins, lipids, saponins, enzymes, flavonoids, vitamins, and avenanthramides (polyphenol).[18] In 1989, the FDA recognized the value of colloidal oatmeal as a safe and effective skin protectant. In 2003, colloidal oatmeal became an approved over-the-counter monograph ingredient.[19] Current, ready-to-use oatmeal preparations are the concentrated starch-protein fraction of the oat grain mixed with emollient.[18] Fine particles disperse on the skin and form a protective, occlusive barrier that retards water loss and moisturizes to help improve the epidermal barrier. Further, oatmeal saponins help to solubilize dirt, oil, and sebaceous secretions which may normalize the skin pH.[20] Oats have important antioxidant, ultraviolet (UV) absorbent, and antiinflammatory properties attributed to the ferulic, caffeic, and coumaric acids, as well as flavonoids and α-tocopherol (vitamin E) components.[21,22] Recent research has identified avenanthramides (phenolic compounds) as a minor component of oat grains, and in vitro work, researchers have demonstrated antiinflammatory and antipruritic properties by decreased production of NF-kappaB (NF-kB) in keratinocytes and reduced proinflammatory cytokine (eg, IL-8) production.[23,24] Avenanthramides have also been reported to inhibit prostaglandin synthesis.[25] As a result, many studies have substan-

Table 2 Natural Ingredients in the Treatment of Rosacea

Product	Source	Active Component
Colloidal oatmeal	*Avena sativa*	Polysaccharides, proteins, lipids, saponins, enzymes, flavonoids, vitamins, avenanthramides
Niacinamide	Vitamin B3 found in foods (meat, fish, wheat)	N/A
Feverfew	*Tanacetum parthenium*	Volatile oils, flavonoids, sesquiterperne lactones
Licorice	*Glycyrrhiza glabra, Glycyrrhiza inflata*	Glabridin, licochalcone A
Teas	*Camellia sinensis*	Polyphenols: epigallocatechin gallate (EGCG) and epicatechin gallate (ECG)
Coffeeberry	*Coffea arabica*	Polyphenols: chlorogenic acid, proanthocyanidins, quinic acid, ferulic acid
Aloe vera	Aloe vera	Salicylic acid, magnesium lactate, gel polysaccharides
Chamomile	*Matricaria recutita, Chamaemelum nobile*	Terpenoids, flavonoids
Tumeric	*Curcuma longa*	Curcumin
Mushroom extracts	*Lentinula edodes, Ganoderma lucidum*	Polysaccharides, teriperpenes, proteins, lipids, phenols, cerebrosides

tiated the antiinflammatory, hydrating, and antipruritic properties of colloidal oatmeal and their use in the management of common inflammatory dermatoses, such as atopic dermatitis. Although additional research is needed to explain its use in other conditions, the data suggest that colloidal oatmeal may be a useful ingredient in cleansers or moisturizers used for rosacea.

Anti-inflammatories

Niacinamide

Niacinamide (also known as nicotinamide) is the amide of nicotinic acid (vitamin B3 or niacin), which is a water-soluble vitamin found in meat, fish, and wheat. It does not have the same pharmacologic and toxic effects of niacin, which occurs incidentally during biochemical conversion. Therefore, niacinamide does not cause flushing, itching, burning, or a reduction in serum cholesterol but does work in oxidation-reduction pathways of nicotinamide adenine dinucleotide and nicotinamide adenine dinucleotide phosphate.[26] Niacinamide acts as an antioxidant but also possesses biological activities, making it an important emerging cosmetic ingredient.[27] Niacinamide has antiinflammatory action, skin-lightening properties, and can decrease the production of sebum; thus, it may be of benefit to patients with inflammatory skin conditions.[28]

A recent open-label, multicenter, prospective cohort study was conducted to assess the clinical utility of oral pharmacologic doses of nicotinamide and zinc in 198 patients with acne vulgaris and/or rosacea.[29] The basis for this investigation was a variety of potential mechanisms of action of nicotinamide and zinc, including: (1) an antiinflammatory effect via inhibition of leukocyte chemotaxis, lysosomal enzyme release, lymphocytic transformation, and mast cell degranulation; (2) bacteriostatic effect against *Propionibacterium acnes*; (3) inhibition of vasoactive amines; (4) preservation of intracellular coenzyme homeostasis; and (5) decreased sebum production.[30] The study's primary efficacy measures were patient global evaluation and patient evaluation of the percentage reduction in inflammatory lesions after 4 and 8 weeks of treatment; overall patient satisfaction also was recorded. The study formulation consisted of nicotinamide, 750 mg; zinc, 25 mg; copper, 1.5 mg;, and folic acid, 500 μg.

After 4 weeks, the number of patients enrolled who reported improvement was significantly greater ($P < 0.0001$) than the number who reported either no change in or worsening of their condition. Seventy-nine percent of patients reported improvement in appearance as moderately better or much better, as measured by patient global evaluation. Fifty-five percent reported moderate (26%-50% reduction in lesions) or substantial (>50% reduction in lesions) improvement after four weeks of treatment ($P < 0.0001$). The percentage of patients who responded to therapy continued to increase through the 8 weeks of treatment. When patients who received concomitant oral antibiotic therapy (51/198, 26%) are compared with those who received vitamin tablets as monotherapy (147/198, 74%), the percentage of patients who responded to treatment was not significantly different between treatment groups ($P = 0.13$). This finding was particularly interesting given that most patients studied considered their condition to be of at least moderate severity (143/198, 72%). The conclusion was that niacinamide and zinc were effective for the treatment of acne vulgaris and rosacea when used alone or with other therapies and should be considered as useful alternatives or adjuncts.

It has recently been shown that topical application of niacinamide has a stabilizing effect on epidermal barrier function, seen as a reduction in transepidermal water loss and an improvement in the moisture content of the horny layer.[31] Niacinamide increases protein synthesis (eg, keratin), stimulates ceramide synthesis, potentiates the differentiation of keratinocytes, and increases intracellular nicotinamide adenine dinucleotide phosphate levels. Given these findings, it is hypothesized that topical application of niacinamide may improve surface structure, reduce rhytides, inhibit photocarcinogenesis, and demonstrate antiinflammatory effects in acne and/or rosacea.[26,32,33]

Feverfew

Feverfew (*Tenaceetum parthenium*), a member of the Asteraceae family and species-specific dried chrysanthemum leaves, is a medicinal herb used traditionally to reduce fever and treat headache, arthritis, and digestive problems.[34,35] The perennial flowering plant has citrus-scented leaves and is reminiscent of daisies. It has potent antiinflammatory, antioxidant, and anti-irritant properties. Its main components are volatile oils (L-camphor, linalool, terpenes), flavonoids, and sesquiterpene lactones (parthenolides). Feverfew inhibits 5-lipoxygenase and cyclooxygenase, resulting in a reduction in platelet aggregation and parthenolides inhibit serotonin release from platelets.[36] Topical use of feverfew had been limited by the potent irritant effects of parthenolides. However, an industry patented process was developed allowing removal of parthenolides. As a result, feverfew PFE (Aveeno; Johnson and Johnson Consumer Companies, Inc, New Brunswick, NJ), a purified feverfew extract, was developed to reduce facial redness and skin irritation by inhibiting the release of inflammatory markers from activated lymphocytes and reducing neutrophil chemotaxis.[37-39] Feverfew PFE has been shown to possess antioxidative and antiinflammatory properties by (1) inhibiting proinflammatory mediators released from macrophages (nitric oxide, PGE_2, tumor necrosis factor-alpha) and human blood monocytes (tumor necrosis factor-alpha, interleukin [IL]-2, IL-4, and interferon-γ); (2) reducing neutrophil chemotaxis; (3) reducing NF-kB-dependent gene transcription; and (4) inhibiting the release of IL-8 and adhesion molecules expressed from keratinocytes.[40-42] This purified extract has been studied and has demonstrated protective effects from UV exposure and irritation, improvements in facial redness, blotchiness, and tactile roughness, and reduction in irritation seen from shaving.[38,43,44]

Licorice Extract

Licorice (*Glycyrrhiza glabra* and *Glycyrrhiza inflata*) plants have been long used in alternative medicine for the treatment of a variety of inflammatory conditions as the result of their presumptive healing powers. *Glycyrrhiza glabra* contains glabridin, and *Glycyrrhiza inflata* contains licochalcone A, both of which have anti-irritant and anti-inflammatory properties.[45,46] Studies have shown that licorice reduces inflammation, promotes mucous secretion, soothes irritation, and stimulates adrenal gland activity.[47] In addition, licorice appears to exert immunomodulatory effects by regulating cytokines and interferon and thus, may have antiviral and antimicrobial activity.[48-50]

Licorice extract is produced by boiling licorice root and subsequently evaporating the water. The main components of the extract include triterpene saponins, flavonoids, and isoflavonoids.[45] Licorice appears to have antiinflammatory properties because of inhibition of superoxide anion production and cyclooxygenase activity.[46] In a laboratory study comparing the antioxidant activity of *Glycyrrhiza* to antioxidants in commercial 2% hydroquinone, researchers demonstrated superior antioxidant activity of the licorice extract at 0.5% and 1% concentrations.[51]

The anti-inflammatory and antioxidant activity of licorice suggests skin care benefits in patients with sensitive skin. In one study, topical preparations (1% and 2%) were evaluated for the treatment of atopic dermatitis in a double-blind clinical trial in comparison with a base gel. Two percent licorice topical gel significantly decreased scores of erythema, edema, and itching over 2 weeks.[52] Another study of a skin care regimen containing licochalcone A (Eucerin Redness Relief; Beiersdorf, Inc, Hamburg, Germany), a retrochalcone derived from *Glycyrrhiza inflata*, demonstrated improvements in mean erythema and quality-of-life scores at 4 and 8 weeks in patients with mild-to-moderate facial redness and were comparable in efficacy with topical metronidazole and azeliac acid.[53] In another study, application of a licochalcone A-containing extract twice daily for 3 days was associated with significant reduction in shaving-induced and UV-induced erythema compared with vehicle control in healthy volunteers.[46]

Antioxidants/Antiaging

Teas

White, green, oolong, and black teas are derived from the leaves and buds of the tea plant (*Camellia sinensis*) and contain potent antioxidant, anti-inflammatory, and anticarcinogenic polyphenols known as catechins.[54-56] Green tea polyphenols, particularly epigallocatechin gallate and epicatechin gallate, appear to be most diverse in initiating cellular/molecular responses in the epidermis.[57] The multiple effects of green tea include inhibition of UV-induced tumorigenesis pathways, including mitogen-activated protein kinase and activator protein-1, as well as the infiltration of inflammatory cells. In addition, green tea possesses antioxidant properties by eliminating reactive oxygen species and inhibiting nitric oxide synthetase, lipoxygenase, cyclooxygenase, and lipid peroxidase. It exerts antiinflammatory activity via inhibition of lipoxygenase and cyclooxygenase as well as by inhibiting the infiltration of inflammatory cells, such as macrophages and neutrophils with subsequent decrease of proinflammatory cytokines (IL-1, IL-8, IL-10, IL-12). Finally, it is anticarcinogenic by inhibiting carcinogen-DNA binding and subsequent tumorigenesis.

Besides the antiinflammatory and antioxidant properties, which make green tea useful in the treatment of rosacea, the protection it affords from UV light makes it particularly useful as rosacea is often triggered by light exposure. Topical applications of green tea (epigallocatechin gallate and epicatechin gallate) have been shown to decrease UV-induced erythema and to reduce DNA damage as demonstrated by measuring cyclobutane pyrimidine dimers.[58-60] These studies demonstrate the chemoprotective effect of green tea extracts and suggest a natural alternative for photoprotection and possibly a treatment for UV-induced rosacea. Green tea may also directly improve the signs of rosacea by reducing the

number and appearance of telangiectasias and minimize the disruption of the skin barrier.[55]

Coffeeberry and Caffeine

Extracts of the coffee plant (*Coffea arabica*) have been shown to exhibit antioxidant activity. It has recently been discovered that the fruit of the coffeeberry plant has effective antioxidant activity.[61] Coffeeberry contains potent polyphenol compounds, including chlorogenic acid, proanthocyanidins, quinic acid, and ferulic acid.[37] These polyphenols help to prevent damage caused by free radical exposure and oxidative stress and have been shown to protect against UVA and UVB radiation.[62,63] Testing by oxygen radical absorbance capacity demonstrates 10-15 times the antioxidant capacity as green tea extract, pomegranate, vitamin C, and vitamin E.[64] Although no conclusive clinical studies assessing topical preparations containing *Coffea arabica* or coffeeberry extract have been performed, preliminary evidence suggests that this extract produces improvement in hyperpigmentation, fine lines, and overall skin appearance.[37,65] The *Coffea arabica* plant is regarded as safe.[66] Current preparations represent a well-tolerated choice for rosacea patients who desire an antiaging regimen. Anecdotally, many of these patients experience a reduction in facial erythema.

Caffeine extracted from the leaves of the *Coffea arabica* plant has been used in some botanic formulations as an active ingredient.[67] Caffeine is known to cause dehydration of fat cells by acting directly to promote lipolysis, inhibit phosphodiesterase, and thus augment cyclic adenosine monophosphate. These characteristics plus its stimulatory effect on cutaneous microcirculation have been used to support topical caffeine as a treatment for lower eyelid puffiness and cellulite.[68,69] Of note, although oral consumption of caffeine had previously been regarded as a risk factor for rosacea activity, a recent study demonstrated only photosensitive skin types, a positive family history of rosacea, or previous smoking status as risk factors compared with healthy control patients.[70] Reports of dermatitis and/or allergic reactions to caffeine in the literature are more likely because of volatile oils found in the coffee grains or added preservatives and fragrances in the topical preparations rather than from the caffeine itself.[71]

Other Botanicals

Aloe Vera

Aloe vera is thought to have antiinflammatory, analgesic, antipruritic, and wound-healing properties.[72,73] Its active components include salicylic acid (antiinflammatory via thromboxane and prostaglandin inhibition), magnesium lactate (antipruritic via histidine decarboxylase inhibition), and gel polysaccharides (anti-inflammatory via immunomodulation).[44] Aloe vera has been studied with success in the treatment of psoriasis and case reports have noted a reduction in burning, itching, and scarring associated with radiation dermatitis.[74-76] One study on burn-wound rats demonstrated significant decreases in vasodilation and postcapillary vascular permeability on the aloe vera-treated group, suggesting a role in inflammatory skin conditions, such as rosacea.[77]

Chamomile

Chamomile (*Matricaria recutita* and *Chamaemelum nobile*) has active components of terpenoids (bisobolol, matricin, and chamazulene) and flavonoids (apigenin, luteolin, and quercetin) in its volatile oils that inhibit cyclooxygenase and lipoxygenase as well as regulate the T helper cell (Th2) activation and histamine release.[78,79] Topical applications have been shown to be beneficial in atopic dermatitis and skin irritation.[80] One study documented the anti-inflammatory effect of topical application to be approximately 60% of that produced by hydrocortisone 0.25%.[81] Chamomile can potentially induce allergic contact dermatitis because it is a member of the ragweed family; therefore, caution is warranted with use on sensitive skin even though it is thought to have soothing effects.

Tumeric

Tumeric (*Curcuma longa*) has a long-standing history of use in Asian cuisine and is best known for its active component curcumin which is reported to have anti-inflammatory, antioxidant, wound healing, and chemopreventive properties.[44,82] Odor and color limit its incorporation into many topical treatments.

Mushroom

Extracts from mushrooms, such as shiitake (*Lentinula edodes*) and reishi (*Ganoderma lucidum*), contain several compounds (polysaccharides, triterpenes, proteins, lipids, phenols, and cerebrosides) of interest for their potent anti-inflammatory and antioxidant properties.[83,84] Main mechanisms of action include the inhibition of lipid peroxidation, superoxide dismutase, metalloproteinases, and proinflammatory cytokines (IL-8), as well as the promotion of free radical scavenging.[85] It is also thought that shiitake mushroom complexes inhibit elastase and activator protein-1, which breaks down collagen, forming the basis for its use in antiaging treatments.[86] Overconsumption of shiitake mushroom has been documented to cause flagellate dermatitis.[87]

Expert Opinion and Pearls

As we have learned more about the pathogenic factors contributing to this complex condition, it is clear that inflammation, inflammatory mediators, and subsequent oxidative damage play a role. The use of anti-inflammatory and antioxidant ingredients, such as those found in botanic products, provide helpful adjuncts to traditional therapies. We often choose products that contain soy, niacinamide, green tea, or feverfew for improving erythema. These products seem to calm the inflammation of rosacea by providing barrier protection and exerting antioxidant and anti-inflammatory effects.

When initiating botanic therapy for rosacea, we recommend spot testing a small area (such as pre- or postauricular)

before full-face use. We then integrate the new topical into the treatment regimen slowly. Patients with rosacea have more sensitive and reactive skin and even a delicate change in therapy can exacerbate the condition. Furthermore, it is of the utmost importance to recommend sunscreens to every patient. Chemical blockers (i.e., octylcrylene, avobenzone, and oxybenzone) may be irritating and we prefer physical blocking agents (i.e., titanium dioxide and zinc oxide). Patients should avoid oil-based topical products, topical corticosteroids, and minimize exposure to hot or spicy foods, alcohol, hot environs, and flush-inducing medications. Lastly, patients should be informed that no topical therapies are effective for telangiectasias, and those with cosmetic concerns can be offered vascular laser or intense pulsed light therapy.

Conclusions

Rosacea patients are increasingly seeking natural alternatives to traditional prescription treatments. Although some natural products show promise, research is limited and further investigation is needed to validate the quality of these ingredients. It is not known whether these products are useful adjuvants or actual alternatives to commonly prescribed treatments. It appears that the theoretic value comes from their inherent anti-inflammatory, anti-irritant, and antioxidant nature. Dermatologists must be aware of what is available and what their patients are using to better coordinate the long-term management of chronic inflammatory conditions like rosacea.

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