

Understanding and Treating Brittle Nails

Zoe Diana Draelos, MD



There is one condition more challenging to treat than bullous pemphigoid and granuloma annulare, brittle nails. Even when patients present for a specific skin condition, most dermatologists have experienced patients asking for advice on the side for treating brittle nails. While at first glance brittle nails may appear to be a simple problem, treatment of this common condition is perplexing. It may even be argued that brittle nails are a variant of normal nails associated with aging and should not even be considered a problem worthy of treatment. Nevertheless, a few ideas on why brittle nails occur and how to effectively minimize the problem are worthwhile.

This article examines the physiology behind brittle nails and presents suggestions on how to prevent the condition. Nail problems are particularly challenging to treat because the nonliving nail cannot be healed and can only be replaced by new growth. This new growth occurs slowly, requiring 6 months or more for a new fingernail to be produced. Treating nail problems never results in immediate gratification and requires faith on the part of the patient that heeding dermatologic advice will produce a positive outcome.

Nail Physiology

Brittle nails are the equivalent of xerotic eczema. Water is the plasticizer of both the nails and the skin. Dehydrated nails become brittle and fracture, whereas dehydrated skin cracks and flakes, exposing the underlying nerve endings to the environment, precipitating itching. While topical corticosteroid anti-inflammatories accompanied by moisturizers are the mainstay of eczema treatment, only moisturizers can be used in the treatment of brittle nails. A barrier composed of corneocytes and intercellular lipids maintains the water content of the skin at 30%.

Dr. Draelos is Consulting Professor, Department of Dermatology, Duke University School of Medicine, Durham, North Carolina.

The author reports no conflict of interest in relation to this article.

Correspondence: Zoe Diana Draelos, MD (zdraelos@northstate.net).

Healing of the skin usually occurs within 2 weeks, which is the turnover time for the stratum corneum. Simply put, the nails do not heal.

At 30% water content, the nails are overhydrated and soft, which is different from the skin's reaction. The optimal water content for the nails is 16%, but this varies with ambient humidity. Under conditions of 20% relative humidity, the water content of the nails drops to 7%. Proper hydration is key, however, as water allows the nails to bend without fracturing. Problems arise when the water is lost because it is not possible to permanently replace the water. Soaking nails in water results in enhanced water loss, not rehydration.

Preventing Brittle Nails

The best treatment for brittle nails is to prevent damage to the newly growing nail plate. Nails become dehydrated with exposure to surfactants and solvents. When the hands are washed, so are the nails. One piece of advice for patients is to wash their hands, but avoid placing surfactants on the nails unless they require cleansing. Hand sanitizers, which are replacing cleansers, are very damaging to the nail plate. The combination of the rapidly evaporating vehicle and the triclosan both cause water loss. All soaps and household cleansers cause water loss in nails, making glove protection of the nails essential.

Strengthening Brittle Nails

Many cosmetic techniques are available to strengthen nails, as this is a profitable market. The common products are nail hardeners that contain formaldehyde. Formaldehyde works to harden nails by cross-linking the keratin protein. While this cross-linking makes the keratin harder, it can also paradoxically make the nails more brittle. Thus, nail hardeners are not recommended for strengthening brittle nails.

Perhaps the best way to strengthen brittle nails is with nail polish. Nail polish places a protective film over the nail plate that thickens the nail. The flexible nail polish polymer, which may be toluene sulfonamide resin or polyester, also increases nail flexibility and acts as a

barrier to contact with water. Problems arise, however, when the nail polish must be removed. Both acetone-containing and acetone-free nail polish removers dehydrate the nail plate. Thus, nail polish can be used in the treatment of brittle nails, but should be removed as infrequently as possible.

Some dermatologists also advocate the use of nail prostheses in brittle nail treatment. While it is true that artificial nails can protect the underlying nail plate, removal of the prostheses is always traumatic to the nail. With prolonged wearing, oxygen transport is decreased and the nail weakens. While prostheses can be worn for a limited time, continued use for the treatment of brittle nails is not recommended.

Diet and Brittle Nails

Some dermatologists also believe that brittle nails can be improved through dietary modification. Nails are pure protein, thus adequate protein intake is necessary for healthy nails. Many strict vegetarians discover their nails are one of the first places to show the effects of incomplete protein ingestion. Biotin has also been implicated as necessary for healthy nails. Egg whites are the richest source of biotin and many individuals do not consume eggs. Nutritionists also believe that biotin absorption across the small intestine decreases with advancing age. This is the rationale for biotin supplementation as part of nail health in mature individuals.

The use of biotin in human nails was adapted from the veterinary use of biotin in racehorses. If a racehorse's hoof splits, it is the end of the animal's career. Veterinarians supplement horse diets with biotin believing that it prevents hoof cracking. Whether biotin is useful in humans to prevent nail splitting has not been proven in large double-blind, placebo-controlled studies.

Nail Moisturization

Perhaps the best way to treat dehydrated brittle nails is with a moisturizer. Two ingredients have the greatest efficacy: urea and lactic acid. Both urea and lactic acid are classified as humectants because they increase the water-holding capacity of the nail. This occurs from digestion of nail keratin that opens up water-binding sites and enhances hydration. The hydration is only

Brittle Nails Summary

- Nails require hydration for flexibility
- Too much or too little water causes problems for nails
- Nail polish and nail prostheses provide only a temporary improvement in nail strength
- Biotin may be a useful dietary supplement
- Any change in nail treatment will take 3–6 mo to see results
- Avoid exposing nails to triclosan, solvents, and household cleaners by wearing gloves
- Apply urea or lactic acid to increase water-binding sites on nail keratin

temporary, however, requiring continued applications of moisturizer.

The urea concentration should be 5% to 20%. A concentration of 20% to 40% urea digests too much of the nail keratin and softens the nails. Remember that 40% urea is used to avulse toenails. The lactic acid concentration should be 5% to 10%. Twice daily application of the urea or lactic acid preparation is sufficient, as too frequent applications will damage the nail plate. More frequent use of nonmedicated moisturizers rich in glycerin and petrolatum can be used each time the hands are washed.

Summary

Brittle nails are indeed a perplexing problem. The basic concepts surrounding brittle nails are summarized in the Table. Prevention is as important as treatment for brittle nails. This article has presented the nail physiology accounting for brittle nails and ideas for prevention. Prevention is perhaps the best treatment, but other options have also been discussed. It is hoped that this article has demystified brittle nails, offering insight for the next patient challenge. ■