

Intra-individual Right-left Comparative Study of Medium Depth Peels in Superficial Nail Abnormalities

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Abstract

Background: Superficial nail abnormalities include conditions which produce nail surface changes such as trachyonychia, pitting and ridging. Mostly, this is a neglected area due to the dearth of treatment options. Glycolic acid peeling has been reported to be effective in such cases. **Aim:** This study aims to assess the safety and efficacy of medium depth peels (70% glycolic acid versus phenol combination peel [8% phenol with 15% trichloroacetic acid]) in patients with superficial nail abnormalities. **Materials and Methods:** A right-left comparative study in patients with superficial nail abnormalities was done. On the right finger or toenails phenol combination peels and on the left side 70% glycolic acid was used in a predefined protocol over 12 weeks. The severity was assessed objectively by a new devised index (Nail Surface abnormality Index (NSI)). Patient's subjective perception of severity was assessed by Visual Analogue Scale (VAS), and that of the physician was assessed by Physician's Global Assessment (PGA) scores. **Results:** A total of 17 patients were enrolled, two dropped out and 15 patients were included in the final analysis (mean age 19.2 years, total 120 nails treated). The mean NSI score declined from 7.88 ± 0.45 to 4.02 ± 0.45 on the right side; and from 8.0 ± 0.45 to 4.32 ± 0.44 on left side, at the end of 12 weeks. The VAS declined from 6.57 ± 0.26 to 3.87 ± 0.33 on right side and from 6.32 ± 0.28 to 3.78 ± 0.32 on left side. According to PGA score, five patients showed good improvement, seven showed moderate improvement and three responded poorly. **Conclusion:** Both the medium depth peels were found to be safe and equally efficacious modalities for treatment of superficial nail abnormalities.

Keywords: Glycolic acid, phenol, pitting, trachyonychia, trichloroacetic acid

INTRODUCTION

The present era of heightened self-grooming practices has also witnessed an increasing use of nail cosmetics and nail art. This reflects the cosmetic importance attached to healthy looking nails in the general population. Even, superficial nail abnormalities have been reported to be distressing for an individual.

Superficial (or surface) nail abnormalities refer to changes confined to the nail plate surface, for example, trachyonychia, pitting, nail ridging and discoloration. Interestingly, these may be the only abnormality or may also be a part of nail manifestations of dermatological diseases like lichen planus or psoriasis. The dilemma arises when the superficial nail changes are a standalone finding; as then, neither do they warrant the use of systemic therapy, nor is the patient willing for the same. Although the use of intra-matrical steroids (triamcinolone acetonide) can be helpful,^[1,2] it is an invasive and painful

procedure, not acceptable to all patients. This leaves us with not many options to help such a condition.

The use of cosmetics or enhancements to camouflage such changes has been reported.^[3] Banga and Patel have evaluated the efficacy of 70% glycolic acid peels in dry, rough, hyperkeratotic nails and found it useful.^[4] The present study was aimed at evaluating the comparative efficacy of two different medium depth chemical peels [70% glycolic acid vs combination peel of 8% phenol with 15% trichloroacetic acid (TCA)] in improving nails with superficial abnormalities.

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MATERIALS AND METHODS

We included 17 consecutive patients with superficial nail abnormalities after a written informed consent. Pregnant or lactating women, heavy manual workers, patients with known allergy to phenol, TCA or glycolic acid (GA) and patients with unrealistic expectations were excluded from the study. Patients with severely dystrophic or thickened nails or any evidence of bacterial, viral or fungal infections were also excluded. None of the patients had any systemic diseases, neither were they on any systemic drugs. The study protocol was designed keeping in mind the ethical principles for human experimentation outlined in the Declaration of Helsinki.

A thorough history pertaining to associated skin or systemic disorders, prior cosmetic procedures and allergies or traumatic/ tic deformities was taken. The details of the nail surface abnormalities were recorded on pre-designed case record form and quantitated with a self-designed objective scoring system, the Nail Surface abnormality Index (NSI). For this, the surface of nail was divided into four quadrants, and each quadrant was scored for four parameters, namely, pitting, discoloration, longitudinal ridging and horizontal ridging. The presence or absence of any of these four parameters was scored as 1 or 0, respectively. Thus, the maximum possible score for a nail was 16 and minimum was 0. The scoring was done at baseline and then after each session. In addition, patient's subjective perception about the degree of nail surface abnormality was assessed with the help of Visual Analogue Scale (VAS). The patient was asked to score each affected nail on a scale of 0–10 with zero being a normal or unaffected nail and 10 being the worst possible score. The physician's perception of improvement was graded by Physician's Global Assessment (PGA) scores (based on clinical assessment as well as evaluation of photographic records). This was graded as good response (>50% improvement); moderate response (25%–50% improvement) and poor response (<25% improvement).

Thereafter, the patients were initiated on a treatment protocol of a right-left comparative evaluation with two peeling agents. On the right-sided nails (fingers or toes), 8% phenol with 15% TCA combination peel (pH 0.5) was used and on the left-sided nails, 70% GA peel (pH < 1) was used in all the patients. Before application of the peel, white soft paraffin was applied on nail folds and cuticle, with cotton-tipped applicator, to prevent any untoward damage to these structures. Then the corresponding peel was applied on the affected nails (right or left sided). A second coat was applied after drying of previous coat. The patients were instructed to wash their nails with plain water after 20 min of application of the 2nd coat. The sessions were repeated at weekly interval for four such sessions and subsequently once in 2 weeks for the next four sessions. Apart from the objective scoring (NSI score), the subjective improvement noticed by both the patient and the physician were evaluated.

In the intervening period, the patients were advised to use white soft paraffin on the nail plates and surrounding areas, once a

day. During the study, the patients were asked to abstain from nail lacquers, thinners or any other nail specific cosmetics. This was to prevent any excessive drying of the nail unit. The study flow is outlined in Figure 1.

RESULTS

Of the total 17 patients enrolled, two patients dropped out after 1–2 sittings, because of inability to come regularly. These two were excluded from subsequent analysis. Of the 15 patients completing the treatment protocol, ten were females and five were males (male: female ratio of 1:2). The mean age was 19.2 ± 1.9 years (mean \pm standard error of mean) (range 10–29 years). The clinical diagnoses in the study group were idiopathic trachyonychia ($n = 6$); longitudinal ridging ($n = 5$); nail lichen planus ($n = 2$) and isolated nail pitting secondary to psoriasis ($n = 2$). A total of 120 nails in these 15 patients were treated (sixty nails each side).

The mean baseline NSI score on both the sides was 7.88 ± 0.45 (right side) and 8.0 ± 0.45 (left side). The patient perceived VAS scores at baseline were 6.57 ± 0.26 (right side) and 6.32 ± 0.28 (left side). The scores were comparable in both treatment groups with no statistically significant differences seen. The study witnessed a steady decline in the score. At the end of 12 weeks, the NSI scores declined to 4.02 ± 0.45 and 4.32 ± 0.44 respectively on the right side (combination phenol peel treated side) and left side (glycolic acid peel treated side) [Figure 2] respectively. The improvement seen was found to be statistically significant ($P = 0.000$) on both the sides. Similarly, the patient perceived VAS score declined from 6.57 ± 0.26 to 3.87 ± 0.33 on the phenol treated side and from 6.32 ± 0.28 to 3.78 ± 0.32 on the glycolic acid treated side and this was also found to be statistically significant ($P = 0.000$). The final scores were also comparable on both sides, suggesting

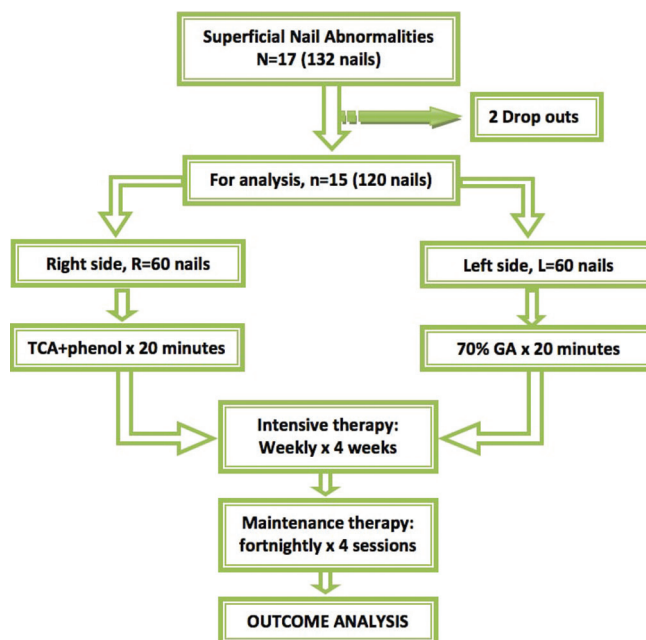


Figure 1: Study flowchart outlining the study design and analysis

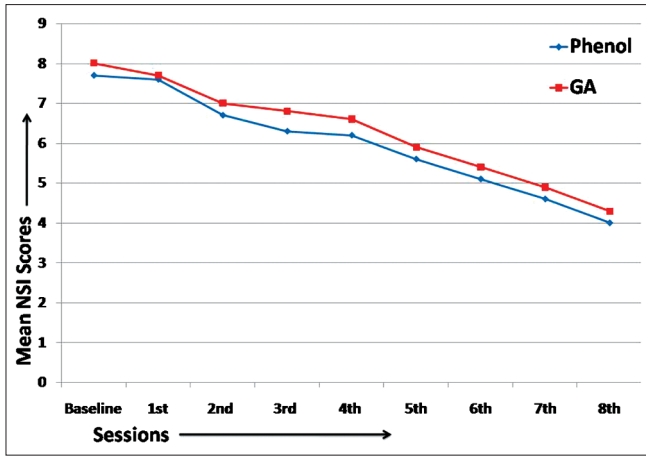


Figure 2: Line graph demonstrating sequential and consistent reduction in the Nail Surface Abnormality Index scores on both the sides, the phenol combination peel and the glycolic acid peel

that both the treatment modalities are equally effective. The PGA revealed that five patients showed good improvement, seven showed moderate improvement and 3 responded poorly. Among the poor responders were one patient each with pitting, trachyonychia and ridging. Rest of the patients showed moderate to good improvement. The sequential improvement in two of the study subjects is evident in Figure 3 (case of nail lichen planus) and Figure 4 (case of trachyonychia).

The medium depth peels were well tolerated with almost no side effects; the only side effect being the development of leukonychia in 2 patients on glycolic acid peels [Figure 5]. On thorough questioning, it was found that these two patients were not complying with the instruction of washing off the peel after 20 min. This error was corrected and thereafter this side effect did not recur. The leukonychia was self-limiting and did not warrant any discontinuation of the peels. No such effect was observed with phenol peels.



Figure 3: Sequential images of a patient with nail lichen planus demonstrating marked improvement in overall texture, pigmentation, ridging and splitting of nails. The upper panel represents right side treated with phenol combination peel, and the lower panel represents the left side treated with glycolic acid peel



Figure 4: Sequential images of another patient with trachyonychia showing the modest improvement. The upper panel represents right side treated with phenol combination peel and the lower panel represents the left side treated with glycolic acid peel



Figure 5: Leukonychia in a patient of nail pitting developing only on the right side, probably due to prolonged contact with glycolic acid peel

DISCUSSION

Having beautiful nails is not one of the recently acquired of human desires. The history of nail lacquers dates back to Egyptian and Chinese civilisations.^[5] In fact, it is speculated that the colour of the nail lacquer denoted the class and status of the person. The use of nail unit for beautification continues to be a common practice, more so in the urban areas.

Superficial nail abnormalities can produce varying psychological effects ranging from complete ignorance or acceptance of the condition at one end to a gross lack of self-confidence and a feeling of depression. With increasing awareness and use of nail grooming practices, these are likely to be noticed more often prompting more patients to seek treatment. On one hand, a patient with superficial nail abnormalities is more likely to feel distressed while using nail cosmetics; while, on the other hand, the use of nail cosmetics can themselves induce superficial nail abnormalities. The excessive use of thinners and nail lacquers can produce brittle nails and yellowish discoloration.^[4,5]

This study was undertaken due to lack of tenable therapeutic options for superficial nail abnormalities. A previous open label study has documented the efficacy of 70% GA in superficial nail abnormalities after single application.⁴ Further improvisations over this technique have also been proposed.^[6] In the present study, we attempted to delineate whether medium depth nail peels are effective and safe therapeutic option for nail. The previous study was based on subjective scoring of improvement; we attempted an objective analysis with a specially devised scoring system (NSI score). It was seen that both phenol combination peel and 70% GA produced a significant decline in NSI score as well as subjective assessment by the patient (based on VAS) and physician (PGA score).

The precise mechanism of the effect of peels on nail plate is not known. On skin, chemical peels act by producing a loss of stratum corneum; inducing dermal remodeling; and stimulating the germinative layer, ultimately leading to skin rejuvenation. The possible actions on nails are dependent on the nuances of nail anatomy and histology and the basic chemistry and physiological impact of the peels. Macroscopically, nail plate is a quadrangular semitranslucent structure that rests on the nail bed; whereas microscopically it is composed of

granular, flattened squamous cells (onychocytes) arranged as tightly packed lamellae. Within the lamellae, the cells remain closely adherent.^[7] The nail plate is derived from the nail matrix with a minor contribution from the nail bed. The dorsal, intermediate and the ventral parts of the nail plate are derived respectively from the proximal, intermediate and the distal matrix; of these, the intermediate part is the thickest. Thus, most of the superficial nail abnormalities such as pitting, ridging and trachyonychia are likely to arise from the proximal nail matrix (ventral proximal nail fold).^[1]

Keeping the structure of the nail plate in mind, the peels chosen need to be medium depth peels. As previous documentation with GA 70% is available, we chose to use a comparative agent (phenol with TCA peel) as well. Glycolic acid is a popular alpha-hydroxy acid for peels because of its small molecular size, enhancing its penetration. It has a keratoregulatory effect at relatively acid pH (equal to or inferior to its pKa), leading to increased flaking and cell replacement. This effect is produced by interference with the activity of enzymes such as sulfotransferases, phosphotransferases and kinases which have role in corneocyte adhesion. At higher pH, it essentially acts only as a moisturiser.^[8] Phenol is a hydroxybenzene and is an aromatic alcohol with weak acidic properties. Phenol acts by causing enzymatic inactivation and protein denaturation thus interfering with cellular permeability, ultimately leading to cell death and shedding.^[8] Thus, both agents act by inducing dis-cohesion of corneocytes/onychocytes and their shedding. The phenol peel has a pKa of 9.9 whereas glycolic acid has a pKa of 3.8.

On serial evaluation of clinical photographs, we could see that although the entire nail plate became shinier and 'cleaner looking'; most of the improvement started proximally, growing distally as the nail plate grew. We can hypothesise that though these peels were causing exfoliation of surface irregularities of the nail plate; they were also inducing improvement by possible effects on the matrix. The mechanism of this action on matrix remains unexplained. It could be because of cellular signals mediated by protein denaturation and shedding of onychocytes induced by peeling. It is also possible that the peeling agent itself was able to penetrate and influence the proximal matrix (ventral aspect of proximal nail fold) through diffusion. The exact mechanism, however, remains to be elucidated with further studies.

Leukonychia developed in two patients on GA peel who did not wash their nails after the prescribed 20 min. Histologically, leukonychia represents foci of parakeratosis persisting within the nail plate. Thus, it is possible that GA penetrated deep enough in these two cases, affecting the intermediate matrix underneath the nail plate, causing disturbed onychokeratinisation. No such changes were observed on the phenol treated side in the same patients. Again, we conjecture that the proteinating and denaturing effect of phenol might limit its deeper penetration. Much further research is needed to comprehend these mechanisms fully.

The other viable options recommended for superficial nail abnormalities in literature include gel nails, nail wraps, acrylic nails, sculptured nails, ultraviolet (UV) cured shellacs, etc.^[3,9] However, all these are essentially camouflage techniques and require complicated steps like UV hardening or use of adhesives or acrylates. They are usually expensive may require special instruments and expertise; and eventually may induce allergic reactions, thus themselves producing superficial nail abnormalities. On the other hand, chemical peels have been evaluated in superficial skin abnormalities adequately. Their role in superficial nail abnormalities is worth further exploration as they offer an opportunity to do more than just camouflage. They could act by normalising the defective onychokeratinisation, although much remains to be proven.

CONCLUSION

Both 8% phenol with 15% TCA combination peel and 70% GA peel were seen to be equally effective medium depth peels for the correction of superficial nail abnormalities without any significant untoward side effects. There were no specific conditions that responded worse or better, although a larger sample size is warranted to arrive at more definitive conclusions. Medium depth peels offer an easy, quick and inexpensive therapeutic modality for patients with superficial nail abnormalities with a reasonably good patient satisfaction sans any systemic side effects.

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Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Gordon KA, Vega JM, Tosti A. Trachyonychia: A comprehensive review. *Indian J Dermatol Venereol Leprol* 2011;77:640-5.
2. Grover C, Bansal S, Nanda S, Reddy BS. Efficacy of triamcinolone acetonide in various acquired nail dystrophies. *J Dermatol* 2005;32:963-8.
3. Nanda S, Grover C. Utility of gel nails in improving the appearance of cosmetically disfigured nails: Experience with 25 cases. *J Cutan Aesthet Surg* 2014;7:26-31.
4. Banga G, Patel K. Glycolic acid peels for nail rejuvenation. *J Cutan Aesthet Surg* 2014;7:198-201.
5. Madnani NA, Khan KJ. Nail cosmetics. *Indian J Dermatol Venereol Leprol* 2012;78:309-17.
6. Grover C. Role of chemical peeling in nail disorders. *J Cutan Aesthet Surg* 2014;7:201-2.
7. Jiaravuthisan MM, Sasseville D, Vender RB, Murphy F, Muhn CY. Psoriasis of the nail: Anatomy, pathology, clinical presentation, and a review of the literature on therapy. *J Am Acad Dermatol* 2007;57:1-27.
8. Dewandre L. The chemistry of peels and a hypothesis of action mechanisms. In: Rubin MG, editor. *Chemical Peels: Procedure in Cosmetic Dermatology*. Philadelphia: Elsevier Inc.; 2006. p. 1-12.
9. Jefferson J, Rich P. Update on nail cosmetics. *Dermatol Ther* 2012;25:481-90.