EFFICACY OF GLYCOLIC ACID PEEL IN SUPERFICIAL NAIL ABNORMALITIES

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ABSTRACT

BACKGROUND

Superficial nail abnormalities include conditions which produce nail surface changes such as trachonychia, pitting and ridging etc. These surface nail changes can be idiopathic or may be acquired. Acquired nail plate changes occur due to external factors (like application of cosmetic products) or as a part of other dermatological (Psoriasis, Lichen Planus, Alopecia Areata) or systemic disease (Hypothyroidism, CRF etc,). Although treating the underlying disease can help in management of nail changes, the visible results in nails takes time to appear due to slow growth rate of nails. In such patients where cosmetic results are desired, glycolic acid peel acts as a non-invasive, non-cumbersome, easy and acceptable method of management.

The aim of the study is to assess the safety and efficacy of medium depth peel (70% glycolic acid) in patients with superficial nail abnormalities.

MATERIALS AND METHODS

A prospective, single-center open-label uncontrolled study conducted at tertiary care hospital in Dermatology OPD between January 2017 to January 2018. A total of 33 cases were taken with superficial nail changes including dryness, roughness, discoloration, pitting and longitudinal ridging.

RESULTS

In 30 patients with dry rough nails, 20 (66.6%) patients had good results 8 (26.7%) patients had average results and 2 (6.6%) were non-responsive to treatment.

CONCLUSION

The nail plate with application of 70% glycolic acid can be a promising treatment for modality for thick, uneven, rough and pigmented nail-plate conditions with cosmetically pleasing results.

KEYWORDS

Glycolic Acid; Nail Pitting.

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BACKGROUND

People are more conscious about nail appearance these days due to increased awareness and desire for beautiful looking nails. Of all nail changes, superficial nail abnormalities are more distressing for an individual.

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Superficial nail abnormalities refer to changes confined to the nail plate surface, for example, trachonychia, 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 Onychomycosis, Lichen Planus, Psoriasis, Twenty Nail Dystrophy or underlying systemic conditions like Hepatic, Renal and Cardio-Pulmonary disorders.[1,2] Multiple nutritional deficiencies and senile idiopathic wear and tear conditions like onychogryphosis, striations, uneven texture and idiopathic onycholysis also cause nail changes.

Patients with nail changes understand that involvement of the nail is a part of underlying cutaneous disorder, treatment of which is more important yet they are concerned about cosmetic appearance.

The dilemma arises when the superficial nail changes are a standalone finding which neither require use of systemic therapy, nor patient is willing for the same. Although the use of intramatricial steroids (triamcinolone acetonide) can be helpful, it is an invasive and painful procedure, not acceptable to all patients.[3,4] Therefore there are not many options to help such a condition. Cosmetics or enhancements can be used to camouflage such changes.[5]

Due to low molecular weight of all alpha hydroxyl acids, glycolic acid has good penetration and acts as keratolytic agent in different skin conditions. This controlled keratolysis helps in clinical improvement of superficial nail abnormalities giving a better-looking nails. Glycolic acid also acts as a humectant and a good exfoliating agent.[6] It can also be used to enhance the transungual transfer of drugs as it breaks the disulfide bonds of nail keratin leading to an increase in nail hydration and permeability.[7]

This study aims to assess the safety and efficacy of medium depth peels (70% glycolic acid) in patients with superficial nail abnormalities.

MATERIALS AND METHODS

Study Design

A prospective, single-center open-label uncontrolled study conducted at tertiary care hospital in Dermatology OPD between January 2017 to January 2018. A total of 33 cases were taken with superficial nail changes including dry, rough, discoloured, pitting and longitudinal ridging. Patients attending OPD in concern of only nail changes was inclusion criteria. Any active infection or inflammation (Paronychia, Onychomycosis) in or around the nails, history of hypersensitivity to glycolic acid and unrealistic expectation were the exclusion criteria.

Procedure, Analysis and Criteria

An informed and written consent was taken from all the patients. Procedure to be done, possible side effects like burning sensation, dryness and peeling and expected outcome of improvement in nail texture only and not in their pathological condition were explained to all patients. Any active bacterial or viral infection in or around the nail was ruled out and potassium hydroxide nail scraping and grams staining was performed as and when required.

Out of 30 patients 26 were not taking any oral or topical treatment for same while 4 patients with Lichen Planus were using topical steroids. Patients were not advised any medical (oral or topical) treatment at the time of the study. They were fully explained that this peel is for cosmetic improvement of nails and has no effect of the medical treatment.

Nail biopsy was performed to confirm the clinical diagnosis. Punch biopsy was taken by disposable 3 mm punch which included nail plate and nail bed. Biopsy was not performed from nail matrix to avoid permanent scarring.

After cleaning the nail with acetone, petroleum jelly was applied on all the cuticle margins and lateral nail folds of nail plate with the help of cotton bud to protect the peri-ungual soft tissues. Possibility of local complications is higher if the cuticle margin is not well protected or if acid dribbles on the surrounding skin. After securing all the cuticle margins, a proprietary preparation of glycolic acid 70% with a pH of 1.5 was applied over the nail plate with the help of a cotton bud. Single coat of chemical were applied. Leave on period was kept at 45 min followed by washing with sodium bicarbonate followed by plain water.

Number of sittings depended on the nail thickness were given. Multiple sittings at 15 days intervals (ranging from three to six) were done patients were advised not to use any prescribed oral or topical medication protocol in between the study period. Patient outcomes were evaluated after every 2 weeks. Patient's satisfaction was graded on the scale of 0-5 for all the patients.

- 4-5: Good.
- 2-3: Average.
- 0-1: Non-responsive.

Statistical Analysis

All the data were statically analysed by Graph Pad InStat3.

RESULTS

Of the total 33 patients enrolled, three patients dropped out after 1-2 sittings, because of inability to come regularly. These three were excluded from subsequent analysis. Of the 30 patients completing the treatment protocol, fourteen (46.7%) were females and sixteen (53.3%) were males. The mean age was 21.8 ± 4.2 years (mean ± SD of mean) (range 15-32 years). Evaluation was done after every 2 weeks.

Clinical diagnosis was made on the basis of nail surface changes which are shown in table 1. Clinical diagnosis was confirmed by histopathological findings in table 2. Nail histopathology shows that majority of cases were -12 (40%) cases of nail LP, 8(26.6%) cases of nail Psoriasis, 5(30%) of Alopecia Areata, 3(10%) of Trachonychia and 2(6.6%) of Pachyonychia Congenita.

Twenty (66.6%) patients had good results, 8(26.7%) patients had average results and 2(6.6%) were non-responsive to treatment. Three sittings of peeling done in 10 (33.3%) patients and five sittings of peeling done in 16 (53.3%) patients and six sittings of peeling done in 4 (13.3%) patients.

11(36.6%) patients showed good results (Lichen Planus and Trachonychia), 17(56.6%) patients showed an average response (Lichen planus, Psoriasis, Alopecia Areata and Trachonychia) and 2(6.6%) were non-responder (Pachyonychia Congenita).

There were no to minimal adverse effects observed. Mild burning sensation, dryness and peeling in and around the cuticle were seen in three patients in this study.

Clinical Morphology	Psoriasis (n=8)	Trachonychia (n=3)	Lichen Planus (n=12)	Alopecia Areata (n=5)	Pachyonychia Congenita (n=2)
Subungual Hyperkeratosis	3	0	0	0	2
Onycholysis	6	0	0	0	0
Coarse Pitting	8	0	0	0	0
Fine Pitting		0	0	5	
Yellowish Discolouration	0	0	5	0	2
Beau's Line	2	0	4	0	0
Longitudinal Striation	3	3	10	0	0
Koilonychia	2	0	0	0	0
Crumbling	1	3	0	0	0
Pterygium	1	0	2	0	0
Blackish Discolouration	0	0	0	0	0
Melanonychia	0	0	8	0	0

Table 1. Clinical Morphology Findings

Nail (HPE)	Psoriasis (n=8)	Trachonychia (n=3)	Lichen Planus (n=12)	Alopecia Areata (n=5)	Pachyonychia Congenita (n=2)
Thick Orthokeratotic	8	3	0	0	2
Thinning of Granular	6	0	0	0	0
Parakeratotic	8	1	0	3	0
Acanthosis	3	3	4	0	2
Thick Spinous Layer	0	0	0	0	2
Hypergranulosis	0	0	0	3	0
Band like Lymphocytic Infiltration	0	3	12	0	0
Elongated Rete Ridges	0	0	8	0	0
Absent Granular Layer	0	0	0	0	2
Hyperkeratosis	0	0	5	5	0

Table 2. Nail Histopathological Findings

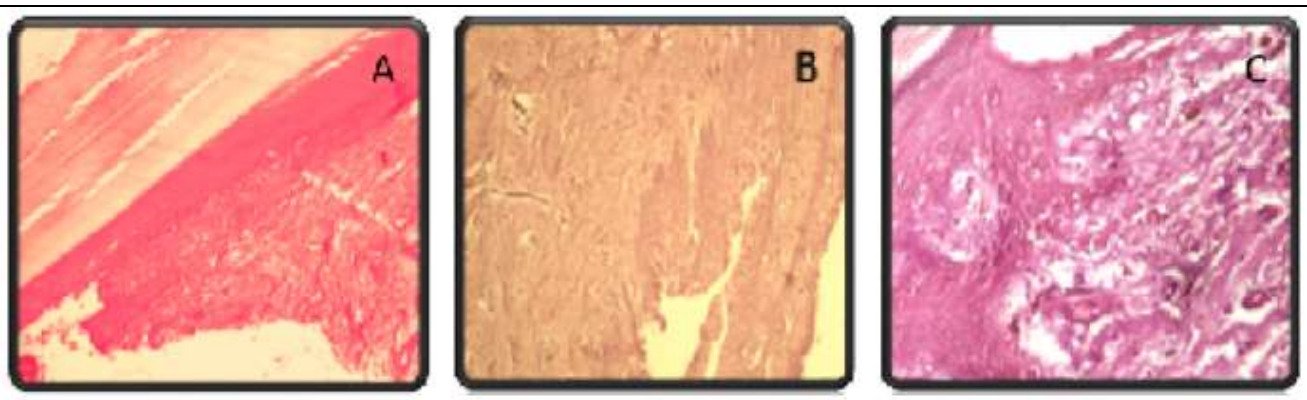

Figure 1

Histopathological Findings of Nail

- **Psoriasis:** Showing hyperkeratosis and parakeratosis, focal hypergranulosis. PAS staining fungal element not seen (4X)
- **Pachyonychia Congenita:** Mild acanthosis with prominent spinous layer, absent granular layer and thick orthokeratotic layer. Dermis was unremarkable. PAS staining fungal element not seen(10X)
- **Lichen Planus:** showing acanthosis, hypergranulosis with colloid bodies with. DEJ- band like lymphocytic infiltration (10X).

Figure 2. Followup of Lichen Planus (A: Day 0, B: Week 2; C: Week 4; E: Week 6)

Figure 3. Nail Psoriasis Pre and Post Treatment (A: Day 0 and B: Week 4)

DISCUSSION

In this study, Out of total of 33 patients 30 were included in study and 3 were drop outs as they were lost on follow up. Out of 30 patients, 11 patients showed good results (Lichen planus and Trachonychia), 17 patients showed an average response (Lichen planus, Psoriasis, Alopecia Areata and Trachonychia) and 2 were non-responder (Pachyonychia Congenita). Non responders with Pachyonychia Congenita can be explained by the fact of excessive thickening of nail plate which do not allows the peel to be absorbed and thus no breaking shedding of onychocytes are seen.

A previous study has documented the efficacy of 70% glycolic acid in superficial nail abnormalities after single application. Further improvisations over this technique have also been proposed in other studies.[8,9] But in our study, we have used multiple (3 to 6) sittings of glycolic acid 70% peel. Three sittings of peeling was done in 10 patients, five sittings in 16 patients and six sittings in 4 patients.

Chemical peels act by producing a loss of stratum corneum, stimulating the germinative layer, inducing dermal remodeling and ultimately leading to skin rejuvenation but its exact mechanism of the action on nail plate is not known.[10]

Medium depth peel was chosen keeping the structure of the nail plate in mind. Glycolic acid is a alpha-hydroxy acid with small molecular size, thereby has deeper penetration. It has a pKa of 3.8 on which it shows the kerato-regulatory effect. It interfaces with the activity of enzymes such as sulfotransferases, phosphotransferases and kinases, thus induce dis-cohesion of corneocytes/onychocytes and promote their shedding. At higher pH, it acts only as a moisturiser.

On evaluation of clinical photographs on follow up, improvement can be appreciated with cleaner and shinier nails, most of the improvement started proximally, growing distally as the nail plate grew. This can be due to exfoliation of surface irregularities of the nail plate through the peel; which also effects the matrix possibly. The mechanism of this action on matrix is not known, it could be because of cellular signals mediated by protein denaturation and shedding of onychocytes induced by peeling. The peeling agent also could penetrate and influence the proximal matrix through direct diffusion.

Gel nails, nail wraps, acrylic nails, sculptured nails, ultraviolet (UV) cured shellacs, etc., are the other available options for superficial nail abnormalities.[6,9] However, all these are complicated, expensive and camouflage techniques, whereas chemical peels is easy, comparatively cheaper and non-invasive method which do more than just camouflage.

Glycolic acid peel is effective medium depth peel for the correction of superficial nail abnormalities without any significant untoward side effects. 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 and any systemic side effects.

CONCLUSION

Application of 70% glycolic acid can be a promising treatment for modality for thick, uneven, rough and pigmented nail-plate conditions with cosmetically pleasing results. It is a safe, cheap and well-tolerated treatment modality. However larger studies with a longer follow up are required to validate the results.

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