

A Study of Nail Changes in Specific Cutaneous Disorders in Patients Presenting to DVL OPD, in a Tertiary Care Centre

Sukhada Wankhade¹, Priya Tamboli², Rajvardhan M. Bagane³, Chandrashekhar S. Purandare⁴, Renuka S. Ashtekar⁵, Shantiprasad A. Tippanawar⁶, Anup A. Phadke⁷

¹Senior Resident; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND. Corresponding Author: sukhada.wankhade24@gmail.com

²Senior Resident; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND

³Assistant professor; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND

⁴Associate professor; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND

⁵Professor & HOD; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND

⁶Professor; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND

⁷Senior Resident; Dermatology, Venereology & Leprosy, Bharati Vidyapeeth (Deemed to be University) Medical College & Hospital, Sangli, Sangli, IND

Abstract:

Background: The primary purpose of the nail is to provide protection, dexterity and accuracy and shields the fingertip and terminal phalanx. Nail also serves to augment the sensation of touch. Nail alterations are commonly observed in daily practice but are usually challenging to understand. With time nail has gained importance as an appendage. The present observational study emphasizes the value of nail findings in papulosquamous disorders, disorders of keratinization & eczema to ascertain a dermatological disease.

Aim & Objectives: To study nail changes and involvement of different parts of the nail unit in specific cutaneous disorders in patients attending DVL OPD

Materials & Methods: Cross-sectional, prospective, descriptive study conducted from October 2022 to April 2024 to determine various nail changes in specific cutaneous disorders in patients presenting to DVL OPD

Result: 122 patients were included in the study, 76 males and 46 females. Most common dermatoses were eczemas with 50 (41%) cases, papulosquamous disorders with 47 (38.5%) cases & disorder of keratinization with 25 (20.5%) cases. Most common nail finding observed was SUH in 39 (32%) cases followed by ridging in 30 (24.6%) cases. Amongst the various parts of nail unit affected matrix, eponychium, hyponychium, nail bed & nail plate were significantly affected

Conclusion: In recent times nail health & cosmetology has started gaining popularity. Nail changes are an indispensable part of dermatological evaluation of patients & might sometimes precede the cutaneous findings. The extent of involvement might correlate with the disease severity. This helps in early diagnosis & helps in efficient management. This study highlights the importance of early identification of various nail findings.

Key words: Nail changes, papulosquamous disease, eczemas, disorder of keratinization, subungual hyperkeratosis

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INTRODUCTION:

In recent times nail as an appendage has gained importance. Nail alterations are commonly observed in daily practice but are usually challenging to understand.^[1] In humans, the primary purpose of the nail is to provide protection. It provides dexterity and accuracy while picking up small objects and shields the

fingertip and terminal phalanx. Nail also serves to augment the sensation of touch.^[2]

The present study emphasizes the value of nail findings in papulosquamous disorders, disorders of keratinization & eczema to ascertain a dermatological disease. In all these disorders nail changes are detected

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late but by then significant damage to the nail unit has

Age	Number	Percentage(%)
Less than 10	5	4.10%
11 to 20	13	10.70%
21 to 30	22	18.00%
31 to 40	30	24.60%
41 to 50	15	12.30%
51 to 60	19	15.60%
61 to 70	11	9.00%
More than 70	7	5.70%

usually occurred & normal functions are impaired.^[3]

The objectives of the study are: 1. To study patterns of nail changes in papulosquamous disorders, disorders of keratinization & eczema. 2. To study the nail changes in different parts of the nail unit in specific cutaneous disorders.

Materials & Methods:

A descriptive, cross sectional, prospective study was carried out in the Dermatology, Venereology, and Leprosy (D.V.L.) department of Bharati Vidyapeeth (Deemed to be university) Medical College & Hospital, Sangli, after obtaining approval from the Institutional Ethics Committee. (Ref: BV (DU)MC&H/Sangli/IEC/Dissertation2021-22/406)

Prevalence of papulosquamous disease = 10%^[4]. Using the formula for proportions with a 99% confidence level ($\alpha = 0.01$) and a margin of error of 7%, the minimum required sample size was 122 participants. Therefore, 122 represents the minimum sample size.

The study enrolled a total of 122 patients from October 2022 to April 2024. Patients willing to participate & papulosquamous disorders, disorders of keratinization & eczema with the nail changes were included after obtaining written informed consent, strictly based on inclusion & exclusion criteria.

A detailed clinical evaluation of each patient was done. Clinical photographs were taken with precautions not to reveal the patient's identity. Findings were observed and recorded in the set proforma. Cases were then sorted according to age, gender, classified into specific dermatoses & the nail findings were noted.

RESULTS:

A total of 122 cases were included. 76 (62.3%) cases enrolled were males & 46 (37.7%) females with the ratio being 1.65:1. Majority of the patients belonged to the age group of 31-40 years i.e 30 (24.6%) cases.

Table 1: Table showing age wise distribution:

Maximum number of study subjects belonged to eczematous group of diseases, accounting to 50 (41%) cases. This was followed by 47 (38.5%) cases in papulosquamous disorders. The least number of study subjects were seen in the group of disorders of keratinization accounting to 25 (20.5%) cases.

50 patients of eczema were further subcategorized as endogenous & exogenous eczema. 43 (86%) cases belonged to endogenous eczema & 7 (14%) cases to exogenous eczema.

Amongst 47 cases enrolled in the group of papulosquamous disorders, 27 (57.4%) patients had psoriasis & 20 (42.6%) patients were of lichen planus.

Under disorders of keratinization majority of cases had palmoplantar keratoderma i.e. 15 (60%) cases.

Table 2: Overall nail changes observed (n=122):

Nail Changes	No.	Percentage
Subungual Hyperkeratosis	39	32.0%
Vertical Ridging	30	24.6%
Pitting	23	18.9%
Trachyonychia	23	18.9%
Thickening	20	16.4%
Onychorrhexis	11	9.0%
Beau's Line	11	9.0%
Thinning of nail plate	10	8.2%
Pigmentation	8	6.6%
Onycholysis	6	4.9%
Pterygium	6	4.9%
Koilonychia	5	4.1%
Loss of Cuticle	5	4.1%
Horizontal Ridges	4	3.3%
Longitudinal Melanonychia	4	3.3%
Pup tent nail	4	3.3%
Leukonychia	3	2.5%
V Shaped Nicking	2	1.6%
Longitudinal Erythronychia	2	1.6%
Onychomadesis	1	0.8%
Onychoschizia	1	0.8%

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Oil drop sign	1	0.8%
Onychodystrophy	1	0.8%
Total	220	

The overall most common nail finding was subungual hyperkeratosis seen in 39 (32%) cases, followed by vertical ridges in 30 (24.6%) cases.

Nail Changes	Nail changes in total no. of cases		Nail changes in endogenous eczema		Nail changes in exogenous eczema	
	(n=122)	(n=50)	n=43	n(%)	n=7	n(%)
Subungual Hyperkeratosis	39	14	11	25.6%	3	42.9%
Vertical Ridging	30	16	16	37.2%	-	-
Pitting	23	5	5	11.6%	-	-
Trachyonychia	23	8	8	18.6%	-	-
Thickening	20	12	11	25.6%	1	14.3%
Onychorrhexis	11	2	1	2.3%	1	14.3%
Beau's Line	11	8	8	18.6%	-	-
Thinning of nail plate	10	4	4	9.3%	-	-
Pigmentation	8	6	6	14.0%	-	-
Koilonychia	5	2	2	4.7%	-	-
Loss of Cuticle	5	3	-	-	3	42.9%
Horizontal Ridges	4	3	1	2.3%	2	28.6%
Longitudinal Melanonychia	4	1	1	2.3%	-	-
Pup tent nail	4	2	2	4.7%	-	-
Leukonychia	3	2	2	4.7%	-	-
Longitudinal Erythronychia	2	1	1	2.3%	-	-
Onychoschizia	1	1	-	-	1	14.3%
Onychodystrophy	1	1	1	2.3%	-	-

Under eczematous disorders, the overall most common finding was vertical ridging accounting to 16 cases (Table 3). Of the total 43 cases of endogenous eczema most common nail finding observed in was vertical ridging in 16 (37.2%) cases, followed by thickening & subungual hyperkeratosis with 11(25.6%) cases each. Out of the total 7 cases of exogenous eczema most common nail finding noted was subungual hyperkeratosis & loss of cuticle with 3 (42.9%) cases each.

Table 4: Nail changes observed in papulosquamous disorders:

Nail Changes	Nail changes in total no. of cases		Nail changes in Papulosquamous Disorders	
	n=122	n=47	n(%)	
Subungual Hyperkeratosis	39	12	25.5%	
Vertical Ridging	30	5	10.6%	
Pitting	23	18	38.3%	
Trachyonychia	23	15	31.9%	
Thickening	20	3	6.4%	
Onychorrhexis	11	9	19.1%	
Beau's Line	11	3	6.4%	
Thinning of nail plate	10	3	6.4%	
Onycholysis	6	3	6.4%	
Pterygium	6	6	12.8%	
Koilonychia	5	1	2.1%	
Longitudinal Melanonychia	4	2	4.3%	
Pup tent nail	4	2	4.3%	
Leukonychia	3	1	2.1%	
Oil drop sign	1	1	2.1%	

Amongst the various findings observed in papulosquamous disorders, the most common nail finding seen was pitting in 18 (38.3%) cases. Least common finding observed was koilonychia, oil drop sign & leukonychia in 1(2.1%) case each (Table 4).

Table 5: Nail changes observed in disorders of keratinization:

Nail Changes	Nail changes in total no. of cases		Disorder of Keratinization	
	n=122	n=25	n(%)	
Subungual Hyperkeratosis	39	13	52%	
Vertical Ridging	30	9	36%	
Thickening	20	5	20%	
Thinning of nail plate	10	3	12%	
Pigmentation	8	2	8%	
Onycholysis	6	3	12%	
Loss of Cuticle	5	2	8%	
Koilonychia	5	2	8%	
Longitudinal Melanonychia	4	1	4%	
Horizontal Ridges	4	1	4%	
Longitudinal Erythronychia	2	1	4%	
V Shaped Nicking	2	2	8%	
Onychomadesis	1	1	4%	

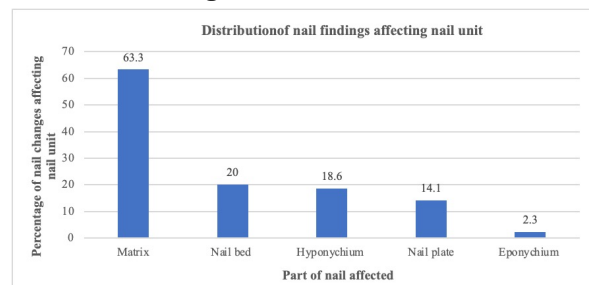
In the group of disorders of keratinization, the most common nail finding was subungual hyperkeratosis in 13 (52%) cases, followed by vertical ridging in 9 (36%) cases. Horizontal ridges, longitudinal erythronychia, melanonychia, onychomadesis being the least common finding seen in 1 (4%) case each (Table 5).

Table 6: Significant nail findings observed in the specific cutaneous disorders included in our study

Nail Changes	Nail changes in total cases. (n=122)	P value
Beau's Line	11	0.038
Horizontal Ridges	4	0.001
Loss of Cuticle	5	<0.001
Onychorrhexis	11	0.012
Onychoschizia	1	<0.001
Pitting	23	<0.001
Pterygium	6	0.018
Trachyonychia	23	0.005
V Shaped Nicking	2	0.048
Vertical Ridging	30	0.005

Amongst the various nail findings beau's lines, horizontal ridges, loss of cuticle, onychorrhexis, onychoschizia, pitting, pterygium, trachyonychia, V shaped nicking & vertical ridging were the significant nail findings noted in my study (Table 6).

Figure 1: Bar chart showing parts of nail affected in various nail changes



Amongst all the nail changes observed, 139 (63.3%) nail changes were secondary to involvement of nail matrix. In my study we found that eponychium was the least affected part of nail unit comprising to only 5 (2.3%) of the total nail changes (Figure 1).

Table 7: Part of nail unit affected in nail findings seen in eczemas:

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Part of Nail Affected	Nail findings affecting nail unit				
	Total (122 cases)	Eczemas (50 cases)	Endogenous eczema (43 cases)		Exogenous eczema (7 cases)
No. nail findings	n=220	n=91	n=80	n(%)	n=11
Matrix	139	56	52	65%	4
Nail bed	44	16	13	16.25%	3
Hyponychium	41	14	11	13.75%	3
Nail plate	31	16	15	18.75%	1
Eponychium	5	3	-	-	3

In patients of eczema, nail matrix was the most common nail unit affected seen in 56 nail findings. Eponychium was affected in 3 patients being the least common nail unit involved in patients of eczema (Table 7).

Table 8: Part of nail unit affected in nail changes seen in papulosquamous disorders:

Part of Nail Affected	Nail findings affecting nail unit		
	Total (122 cases)	papulosquamous Disorders (47 cases)	
No. nail findings	n=220	n=84	n%
Matrix	139	65	77.38%
Nail bed	44	13	15.48%
Hyponychium	41	12	14.29%
Nail plate	31	6	7.14%

Amongst the 84 nail findings observed in papulosquamous disorder, nail matrix was the most common affected part of nail unit i.e. in 65 (77.38%) nail changes, followed by nail bed involvement which was affected in 13 (15.48%) nail findings. 6 (12.8%) nail changes seen in papulosquamous disease were seen secondarily to the involvement of the nail plate (Table 8).

Table 9: Part of nail unit affected in nail findings seen in disorders of keratinization:

Part of Nail Affected	Nail findings affecting nail unit		
	Total (122 cases)	Disorders of keratinization (25 cases)	
No. of nail findings	n=220	n=45	n(%)
Matrix	139	18	40%
Nail bed	44	15	33.33%
Hyponychium	41	15	33.33%
Nail plate	31	9	20%
Eponychium	5	2	4.44%

Out of the total 45 nail changes observed in disorders of keratinization 18 (40%) nail changes were secondarily to the involvement of nail matrix thus, being the most commonly affected nail unit. Least common part of nail affected was eponychium in 2 (20%) nail changes (Table 9).

Amongst the various parts of nail affected nail matrix, eponychium, hyponychium, nail bed & nail plate were significantly affected part of nail in our total study population.



Figure 2: A: Onychorrhexis, B: Subungual hyperkeratosis, C: Onycholysis, D: Vertical ridging, E: Longitudinal melanonychia, F: Beau's line



Figure 3: A & B: Pitting, C: Oil drop sign, D: Trachyonychia, E: Pup tent nail, F: Pterygium

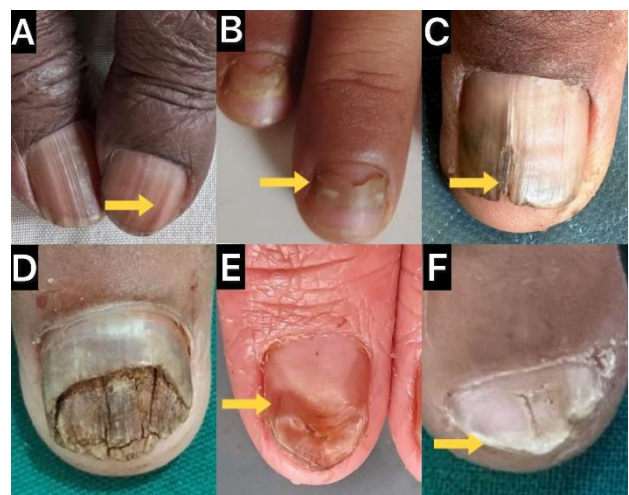


Figure 4: A: Longitudinal erythronychia, B: Onychomadesis, C: V shaped nicking, D: Nail plate destruction with subungual hyperkeratosis, E: Another view of nail plate destruction

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Koilonychia, F: Onychoschizia

DISCUSSION:

Nail changes may precede cutaneous manifestations and sometimes only nail alteration can be seen in patients without any other clinical features. As dermatologists are well versed with the normal nail anatomy & various nail changes specific to cutaneous and systemic disorders, these nail alterations can be picked up earlier and treated accordingly.

In our study a total of 122 cases were included out of which 76 were males (62.30%) & 46 were females (37.70%). Male preponderance was observed. Most frequent age group involved was 31-40 years. The age of patients ranged from 1 to 83 years. The mean age being 39.6 (± 18.97) years.

Out of the total cases enrolled 50 (41%) cases belonged to eczematous group of disorders followed by papulosquamous disorders being 47 (38.5%) cases & disorder of keratinization being 25 (20.5%) cases.

In our study the most common nail finding in total study subjects observed was subungual hyperkeratosis in 39 (32%) cases followed by vertical ridging in 30 (24.6%) cases.

Out of the 220 nail changes observed in our study in the 3 specific disorders included, 139 (63.2%) nail changes were secondary to the involvement of nail matrix. 5 (2.3%) nail changes were attributed to the involvement of eponychium. Thus, nail matrix was the most commonly affected part of nail unit while eponychium was the least affected part.

Out of the total study subjects enrolled 47 (38.5%) cases belonged to the group of papulosquamous disorders. The overall most common nail finding in this group was pitting accounting to 18 (38.3%) cases followed by trachyonychia in 15 (31.9%) cases.

Most common part of nail affected amongst the nail findings seen in papulosquamous disorders was nail matrix, seen in 65 (77.38%) nail changes, while the least commonly affected part was nail plate accounting to 6 (7.14%) nail findings. A study done by [Panda D.](#) et al in 2022 included 203 patients of which 55.6% patients were of psoriasis & 20.68% of lichen planus.^[5] These findings were similar to our study where 57.4% patients of papulosquamous disorders were of psoriasis whereas percentage of lichen planus patients was slightly higher in our study 42.6%. Antony A et al did

a study on nail patterns in papulosquamous disorders in 2021. In their study they enrolled 104 patients out of which 66% patients were of psoriasis & 13% patients were of lichen planus.^[4] In above mentioned studies, the sample size was larger as compared to our study and papulosquamous disorders other than psoriasis and lichen planus were also enrolled which was not the case with our study. This explains higher percentage of lichen planus cases in our study as compared to others.

In our study most common nail finding was pitting seen in 18 (38.3%) cases. In 2021 Antony A et al did a study and observed that pitting of nails was the most common nail pattern (n=44; 62%), followed by subungual hyperkeratosis (n=24; 34%).^[4] A study done by David BG et al in 2016 observed that pitting was the most common finding in their study comprising 60% of the total cases, followed by subungual hyperkeratosis in 46%.^[6] In a study by Wali V et al in 2021 the most common nail finding they came across was pitting. It was observed in 81% of patients. Second most finding was trachyonychia in 50%.^[7] A study done by Dr. R.K Singh et al in 2021 enrolled a total of 100 cases. The most common nail finding was pitting in 81% of patients followed by 50% cases with trachyonychia.^[8] This was consistent with our study, where authors unanimously reported pitting to be the most common nail finding in papulosquamous disease.

In the present study trachyonychia is found to be the second most common finding. This finding is supported by results of studies done by Wali V et al & R.K Singh et al. which also reported trachyonychia as the second most common finding.^[7,8] In study done by Antony et al, subungual hyperkeratosis was seen in 34% of cases which was similar to the findings in our study seen in 25.5 % cases.^[4]

The above studies were dedicated to nail findings in papulosquamous disorders alone thus explaining variations in our study, as it includes only 47 patients of papulosquamous disorder.

Out of a total 122, 50 (41%) cases belonged to eczematous group of disorders. 43 (86%) cases belonged to endogenous eczema, while 7 (14%) cases belonged to exogenous eczema. A study done by Rathi S et al. in 2018, enrolled 225 cases of various dermatoses. Amongst these, 12 cases were of eczema.^[9] A study on nail changes in different dermatoses done by Kumar Y et al. in 2020 enrolled a total of 269 cases out of which 11 cases belonged to

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eczemas.^[10] The discrepancy in above findings might be explained by the fact that in our study we have included only 3 specific dermatoses as opposed to the above mentioned studies which have included a number of cutaneous disorders.

The most common overall nail finding in eczematous group of disorders was vertical ridging seen in 16 cases, followed by subungual hyperkeratosis in 14 cases. Most common nail finding observed in endogenous eczema was vertical ridging in 16 (37.2%) cases, followed by thickening & subungual hyperkeratosis in 11 (25.6%) cases each. Least common findings being horizontal ridges, longitudinal erythronychia, longitudinal melanonychia, onychodystrophy & onychorrhexis in 1 (2.3%) case each. Most common nail finding noted in exogenous eczema was subungual hyperkeratosis & loss of cuticle with 3 (42.9%) cases each. Onychorrhexis, onychoschizia & thickening of nail plate were the least common findings noticed in 1 (14.3%) each. Matrix was most commonly affected part of nail in the patients with eczemas. This accounted to 56 nail findings observed in this specific cutaneous disorder.

Rathi S et al. enrolled 12 cases of eczema, amongst these 8 cases had ridging, followed by pigmentation in 7 cases, SUH in 7 cases & pitting in 3 cases.^[9] The findings in our study are similar to this study, with 16 cases having ridging, followed by SUH in 14 cases, pigmentation in 6 cases & pitting in 5 cases.

In a study done on atopic dermatitis by Chung BY et al in 2019, enrolled a total of 235 patients. Out of total cases only 24 (10.2%) patients had nail abnormalities. Most common nail abnormality observed amongst the cases of atopic dermatitis in their study was beau's line in 6 (25%) cases. Trachyonychia & leukonychia was observed in 3 (12.5%) cases each.^[11] In our study, under a broad category of endogenous eczemas, 25 cases accounted to atopic dermatitis. Beau's line was observed in 6 (24%) cases, trachyonychia in 6 (24%) cases & leukonychia in 2 (8%) cases. Thus, the findings in our study were in agreement with the findings of the above study with respect to atopic dermatitis. However, the variation in percentage seen might be explained by very large sample size in the above mentioned study.

In a total of 122 patients included, 25(20.50%) cases belonged to disorder of keratinization.

In our study majority of cases observed were of palmoplantar keratoderma which accounted to 60% (15 cases) & other disorders of keratinization such as

Darier's disease & ichthyosis grouped together accounted to 40% (10 cases).

The most common nail finding we came across in disorder of keratinization was thickening of nail plate in 7 (28%) cases & least common being onycholysis & koilonychia in 1 (4%) cases each. In disorders of keratinization nail matrix was most commonly affected in 18 (40%) nail changes. Least common part of nail affected was eponychium attributing to 2 (4.44%) nail changes. In a study of Darier's disease done by Dr. P.V Ramana et al. in 2019 they enrolled a total of 15 cases. Longitudinal erythronychia was seen in 14 (93.3%) cases & V shaped nicking was seen in 13 (86.6%) cases.^[12]

In a study on Darier's disease done by Savas S. et al in 2018 they included 9 cases out of which 5 cases had nail changes. This study showed longitudinal erythronychia & V shaped nicking of nail as most common finding with 4 (80%) cases each. Subungual hyperkeratosis was observed in 2 (40%) patients.^[13] In our study 3 cases of Darier's diseases were enrolled and most common nail finding was V shaped nicking & subungual hyperkeratosis in 2 (66.6%) cases each, followed by longitudinal erythronychia in 1 (33.3%) case. There is a slight variation in the findings in our study as this study was not exclusively dedicated to Darier's disease. Also, the limited number of cases of this specific disease, might cause exclusion of certain common findings observed in this disorder.

Amongst the various nail findings beau's line, horizontal ridges, loss of cuticle, onychorrhexis, onychoschizia, pitting, pterygium, trachyonychia, V shaped nicking & vertical ridging were the significant nail findings. In literature there are no studies which state the significant nail findings in the specific cutaneous diseases considered in our study, thus supportive evidence for these findings are lacking. Amongst the various parts of nail unit affected matrix, eponychium, hyponychium, nail bed & nail plate were significantly affected.

Conclusion: In recent times nail health & cosmetology has started gaining popularity. Nail changes are an indispensable part of dermatological evaluation of patients & might sometimes precede the cutaneous findings. The extent of involvement might correlate with the disease severity. This helps in early diagnosis & helps in efficient management. This study highlights

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the importance of early identification of various nail findings.

Our study is unique in including all these disorders, but for further knowledge and to have a comprehensive overview, more studies need to be done on community basis and involving larger sample size.

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