Nail Changes in Leprosy: Onychoscopy Evaluation

Abstract

Context: Repeated trauma involving extremities (in the setting of peripheral neuropathy) and poor vascularity that impairs wound healing are important causes of disability and deformity in leprosy patients. Nail changes can serve as indicators of trophic changes due to leprosy. Aims: To describe the onychoscopy findings in leprosy cases and to identify any specific findings in leprosy patients in comparison to controls. Settings and Design: The first 30 leprosy patients and 30 age and sex-matched controls who attended our tertiary care center from 1 August 2018 were included in this cross-sectional study. Materials and Methods: Onychoscopy examination of all fingernails was performed at 50× magnification using dino-lite dermoscope AM4113ZT under non-polarizing light to document surface changes and under polarizing light to document pigmentation and vascular changes. Statistical Analysis: The observed nail changes in cases and controls were compared using Pearson’s Chi-square test. Results: Statistically significant association with leprosy was found for pitting, onycholysis, melanonychia, transverse lines, nail pallor, and onychauxis. Nail pallor was unique to leprosy patients. Limitations: Small sample size and not evaluating toenails were the major limitations of the study. Conclusions: Studies with large sample size are needed to assess the significance of nail pallor as a specific onychoscopy finding in leprosy.

Keywords: Dermoscope, leprosy, onychoscopy

Introduction

Leprosy leads to nail changes in 75% of the affected.[1] The documented nail changes in leprosy are depicted in Table 1.[1-3]

Bilateral symmetry in nail involvement is described as a feature of the lepromatous spectrum of disease whereas asymmetry has been the usual finding in the tuberculoid spectrum.[1] Rajput et al. in an observational study in 125 cases recorded unilateral involvement of nails common in the tuberculoid spectrum.[4] Similarly, more severe nail changes are described in long-standing disease.[1] Previous studies on nail changes in leprosy observed no specific manifestation for the disease but documented greater frequency of nail changes in the affected. To the best of our knowledge, there are no studies that performed onychoscopy evaluation of nails in leprosy patients.

We carried out this pilot study to document nail changes in leprosy and to identify any specific findings in leprosy patients. We opted for onychoscopy examination so as to identify subtle changes unique to leprosy.

Materials and Methods

In this comparative cross-sectional study, we serially studied all fingernails of the first 30 leprosy patients who completed at least 3 months of multidrug therapy and who were on regular follow-up at our tertiary care institution. All fingernails of 30, age- and sex-matched controls selected from people accompanying patients attending the dermatology department were also studied. Clearance from the institutional ethics committee and written informed consent from individuals were obtained.

Patients suffering from diseases known to cause nail changes (psoriasis, lichen planus, alopecia areata, and collagen vascular diseases) and those with predisposing factors that could produce peripheral neuropathy (alcoholism, diabetes mellitus, hypothyroidism, hereditary neuropathies, HIV, and trauma-related peripheral nerve disease) were excluded from the study.

Using a preset pro forma, data on age and sex profile of the affected, duration of disease, history suggestive of type 1 (T1R) and type 2 (T2R) lepra reactions, clinical
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| Nail change                                         | Probable cause                              |
|-----------------------------------------------------|---------------------------------------------|
| Subungual hematomas, onycholysis, onychauxis (thickened nails), onychogryphosis (hypertrophy that may produce nails resembling claws or a ram’s horn), pterygium unguis, onychoheterotopia (ectopic nail, defined as the growth of nail tissue in any site other than the classical nail unit areas) Brachyonychia/racquet nails (flattened nail plate, thumb showing widened and flattened end and abnormally short distal phalanx where the width of the nail bed and nail plate is greater than their length) Anonychia Longitudinal striae, pitting, maculonuла, Terry nails, leukonychia, hapalonychia/egg-shell nail (condition in which the top of a toe or fingernail becomes soft and thin, causing it to bend or break) Beau’s lines, subungual hyperkeratosis Beau’s lines, koilonychia Nail pallor | Nerve damage and trauma Acroosteolysis of advanced stages of the disease Trauma, effects of chronic disease Dapsone, Clofazimine, Anemia of chronic infection Anemia of chronic infection, dapsone induced anemia |

picture with special reference to sensory/motor nerve function impairment affecting hands and fingers, the spectrum of disease (determined on the basis of clinical, skin smear, and histopathology findings) and treatment received were collected.

KOH examination and culture were carried out in suspected cases of fungal infections of nails.

Onychoscopy examination of all fingernails was performed at 50× magnification using dinolite dermoscope (AM4113ZT) with polarizing and non-polarizing lights to document surface changes of nails and pigmentation and vascular changes respectively.

The data were entered in Microsoft Excel and analyzed with SPSS version 18. Pearson’s Chi-square test was used to compare the nail changes observed in cases and controls. The correlation coefficient was used to analyze the association between nail changes and the duration of disease. A $P$ value below 0.05 was considered significant.

**Results**

The study group comprised of 22 males and 8 females (male:female—2.75:1) with leprosy and 30 age- and sex-matched controls. Age of the study population ranged from 16 to 74 years (mean and standard deviation: 41.2 ± 17.7 years). The duration of the disease varied from 45 days to 180 months (mean and standard deviation: 26.75 ± 37.63 months). 17/30 cases (56.7%) had disease duration of 1 year or less and three (10%) had disease duration for more than 5 years. Among the cases, there were 18 (60%) borderline tuberculoid, five (16.7%) borderline lepromatous, four (13.3%) pure neuritic, two tuberculoid (6.7%), and one (3.3%) indeterminate leprosy patients. All except three patients (10%) were receiving multibacillary treatment (27/30, 90%).

Eight patients (26.7%) gave history/presence of T1R at the time of the study; two (6.7%) others gave a history of T2R.

All the cases (100%) and 28/30 (93.3%) controls had longitudinal striations [Figure 1]. Leukonychia [Figure 2] was more frequently observed in controls (19/30, 63.3%) than in cases (14/30, 46.7%); the difference was statistically not significant.

Excluding longitudinal striations and leukonychia, one or more nail changes were observed in 28/30 cases (93.3%) and 20/30 (66.7%) controls. This was statistically significant ($P$-value = 0.02). Nail pallor, paronychia, onychomycosis, and onychauxis were observed only in cases [Table 2]. Statistically significant association with leprosy was found for pitting [Figure 3], onycholysis, melanonychia, transverse lines [Figure 4], nail pallor [Figures 5a and 6Sa-Se], and onychauxis [Table 2]. Terry’s nails, diffuse leukonychia, and flag signs were not recorded in the study.

The mean hemoglobin value of 11 patients who manifested nail pallor (11.07 ± 0.81) was compared with that of the 19 patients who did not have nail pallor (11.81 ± 1.75) [Figures 5b and 6Sd]. The difference was statistically not significant.

Excluding longitudinal striations and leukonychia, number of fingers affected ranged from 0 to 5 in each hand in both cases and controls. Number of different nail changes observed in single nail ranged from 0 to 6 in cases and 0 to 2 in controls.

Number of fingers showing nail changes and number of different nail changes observed per finger were more in cases than in controls. The differences were statistically significant [$P$ value = 0.00, Table 3].

Except for nail pallor and brachyonychia, all documented changes were distributed asymmetrically between hands. Nail pallor was documented in all nails in 10/11 (90.9%) patients who manifested the same; in one patient it spared the ring and little fingers. Brachyonychia was noted in one patient and one control and in both, it affected all nails.

Sensory impairment affecting hands was noted in 16 cases (53.3%). No association was observed between
The frequency of changes documented by us in leprosy cases (93.3%), after exclusion of common nail sensory impairment of hand and the changes affecting corresponding nails.

No association was noted between the duration of disease and nail changes either.

**Discussion**

The frequency of changes documented by us in leprosy cases (93.3%), after exclusion of common nail
manifestations (longitudinal striations and leukonychia) seen in the control population, was higher than the observations of Kaur et al. (38% in paucibacillary and 68% in multibacillary cases), Patki and Baran (64%), and Rajput et al. (80%) despite limiting the study to fingernails. This could be a reflection of evaluating patients using dermoscope by us.

We included only patients who completed at least three months of MDT so as to avoid missing the effects produced by anti-leprosy drugs. Our observation of comparable frequency of longitudinal striations and leukonychia among cases and controls was consistent with the literature. Previous authors have also excluded transverse striations while evaluating leprosy cases since they found the former to manifest with comparable frequency in normal subjects as well. But we analyzed transverse striations in our patients since we noted a statistically significant increase in the frequency of the same in cases when compared to controls. We used the term transverse lines rather than Beau’s lines since these changes were not seen in all nails and not at the same level in different nails of the same individual which is considered as a feature of Beau’s lines reflecting its association with systemic disease.

Bilateral symmetry and universal involvement of nails for nail pallor observed in 10/11 (90.9%) cases and absence of this finding in any of the controls in the present study indicate the need to explore the possibility of nail pallor being specific to leprosy. Pallor has been recorded in the nail of leprosy patients by previous authors. These studies did not have control population to compare with and the authors suggested that the pallor could possibly be due to anaemia associated with dapsone treatment. A comparison between leprosy patients with and without nail pallor by us showed no statistically significant association between nail pallor and anaemia. This suggests a probable etiological role for reduced vascularity in causing nail pallor. Onychoscopy evaluation in more number of patients belonging to all spectra of leprosy may help us to identify the exact etiology of nail pallor.

Though onychomixcosis, paronychia, and onychauxis were also not documented in any of the controls, we can’t arrive at any definite conclusions since these are seen quite frequently in the general population as well. Studies with large sample size are needed to determine whether the mentioned changes have a definite association with the disease.

As per literature, longitudinal melanonychia was the most common finding in fingernails of patients while the present study recorded nail pitting as the most frequent finding followed by longitudinal melanonychia.

Our observation of onychomixcosis in about 13% of study participants fell between the 0 and 32% reported in previous studies.

Our observation of none of the two T2R cases manifesting pterygium unguis, shoreline nails, Beau’s lines and resorption of terminal phalanges that were described as features of T2R was consistent with an Egyptian study. Contrary to previous studies none of our patients manifested diffuse leukonychia/Terry’s nails/flag sign (alternating horizontal bands of white and pink discoloration of nails).

All the study population who manifested leukonychia had the punctate variant, which was consistent with the observation of Kaur et al.

The average number of fingernails affected per patient recorded by us was comparable to previous studies. We excluded longitudinal striations and leukonychia while assessing this parameter since these changes were comparable in patients and controls.

The lack of association observed between disease duration and nail changes in our patients could be explained as due to the paucity of patients with disease of long duration since only three (10%) out of the 30 cases studied had disease duration of more than 5 years.

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**Table 2: Comparison of nail changes observed in leprosy cases and controls**

| Nail change                  | Number of study participants showing the specific manifestation |   |
|------------------------------|------------------------------------------------------------------|---|
|                              | Cases (%)             | Controls (%)             |   |
| Longitudinal striations      | 30 (100%)            | 28 (93.3%)              | 0.49 |
| *Onycholysis                 | 12 (40%)             | 4 (13.3%)               | 0.02 |
| Paronychia                   | 5 (16.7%)            | 0 (0%)                  | 0.05 |
| Onychomixcosis               | 4 (13.3%)            | 0 (0%)                  | 0.11 |
| *Melanonychia                | 16 (53.3%)           | 6 (20%)                 | 0.007 |
| *Pitting                     | 19 (63.3%)           | 8 (26.7%)               | 0.004 |
| True leukonychia             | 14 (46.7%)           | 19 (63.3%)              | 0.194 |
| *Transverse lines            | 13 (43.3%)           | 3 (10%)                 | 0.004 |
| *Nail pallor                 | 11 (36.7%)           | 0 (0%)                  | 0.00 |
| Haplonychia                  | 3 (10%)              | 1 (3.3%)                | 0.00 |
| Flat nails                   | 3 (10%)              | 0 (0%)                  | 0.24 |
| *Onychauxis                  | 6 (20%)              | 0 (0%)                  | 0.02 |
| Brachyonychia                | 1 (3.3%)             | 1 (3.3%)                | 1.00 |
| Onychorrhexitis              | 4 (13.3%)            | 1 (3.3%)                | 0.35 |
| Subungal hyperkeratosis      | 2 (6.7%)             | 1 (3.3%)                | 0.55 |

*Nail changes that showed statistically significant association with leprosy

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**Table 3: Average number of finger nails manifesting changes per person and number of different changes per finger nail in leprosy cases and controls**

| Average number of finger nails manifesting changes per person | Average number of different changes per finger nail |
|-------------------------------------------------------------|--------------------------------------------------|
| Cases | Controls | Cases | Controls |
| 6.87±3.00 | 3.23±2.70 | 1.11±0.72 | 0.35±0.30 |

P=0.00

*Nail changes other than longitudinal striations and leukonychia (which were seen with equal frequency in cases and controls) were considered
Limitations
Small sample size and not evaluating toenails were the major limitations of the study.
We observed a higher frequency of nail changes in leprosy when compared to controls that are consistent with existing literature.[3] We suggest the association of nail pallor with leprosy needs to be analyzed in detail in future studies.

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Nil.

Conflicts of interest
There are no conflicts of interest.

References
1. Romero B, Rincon JMR, Rabell FR. Nail involvement in leprosy. Actas Dermosifiliogr. 2012;103:276-284.
2. Patki AH, Baran R. Significance of nail changes in leprosy: A clinical review of 357 cases. Semin Dermatol. 1991;10:77-81.
3. Kaur I, Chakrabarti A, Dogra S, Rai R, Kumar B. Nail involvement in leprosy: A study of 300 patients. Int J Lepr Other Mycobact Dis. 2003;71:320-7.
4. Rajput CD, Nikam BP, Gore SB, Malani SS. Nail changes in leprosy: An observational study of 125 cases. Indian Dermatol Online J 2020;11:195-201.
5. El Darouti MA, Hussein S, Al Tahlawy SR, Al Fangary M, Mashaly HM, El Nabrawy E, et al. Clinical study of nail changes in leprosy and comparison with nail changes in diabetic patients. J Eur Acad Dermatol Venereol 2011;25:290-5.
6. Patki AH, Mehta JM. Dapsone-induced erythroderma with Beau’s lines. Lepr Re 1989;60:274-7.
7. Pavithran K. Shoreline nails following type II lepra reaction. Indian J Lep 1993;65:225-7.