



A CROSS-SECTIONAL STUDY OF NAIL CHANGES IN LEPROSY PATIENTS ATTENDING A TERTIARY CARE CENTER

Dr Adira Bhuvanasree	Senior Resident, Department Of Dermatology, Venereology And Leprosy, Osmania Medical College, Hyderabad.
Dr A Venkatakrishna	MD, Professor, Department Of Dermatology, Venereology And Leprosy, Osmania Medical College, Hyderabad.
Dr Malini Panati	MD, Associate Professor, Department Of Dermatology, Venereology And Leprosy, Osmania Medical College, Hyderabad.
Dr B Raghu Kiran	MD, Associate Professor, Department Of Dermatology, Venereology And Leprosy, Gandhi Medical College, Hyderabad.
Dr S Shahena	MD, Associate Professor, Department Of Dermatology, Venereology And Leprosy Osmania Medical College, Hyderabad.

ABSTRACT

Introduction: Leprosy is a chronic infectious disease primarily affecting skin and nerves. Although disease involves nails indirectly, nail changes are observed in many patients. Nail changes though not specific to disease can serve as indicator of trophic changes due to leprosy. **Objectives:** To determine clinical pattern and frequency of nail changes in leprosy patients with different spectrums of the disease. **Methods:** It was an observational study involving 100 patients. Patients were grouped as per Ridley- Jopling classification and further subdivided as per age, sex, and duration and reaction status. Nail examination was done thoroughly and various nail changes were summarized and compared. **Results:** Overall prevalence of nail changes was 80% with prevalence of 85.7% in TT group, 68.5% in BT group, 100% in BB group, 93.7% in BL group and 82.3% in LL group. Longitudinal melanonychia was the most common nail finding. Longitudinal melanonychia was commonest in TT and BT patients, brown black discoloration in BL patients and longitudinal melanonychia in LL patients. Anonychia, rudimentary nails, brachyonychia were not found in tuberculoid pole. Transverse lines were more frequent in ENL patients. **Conclusion:** Nail changes in leprosy are multifactorial and can be due to neuropathy, endarteritis, trauma, drugs or superimposed infections. Nail changes in leprosy can serve as an additional clue to diagnosis.

KEYWORDS : Leprosy, nail changes, prevalence

INTRODUCTION

Leprosy is a slowly progressive, mildly infectious disease caused by *Mycobacterium leprae* which primarily affects skin and nerves(1,2). Nails are windows to one's systemic health. Many systemic diseases are associated with some characteristic nail changes. Though specific nail changes are not seen but they are very characteristic(2). The disease involves nails either directly or indirectly and are caused by many factors like neuropathy, vascular deficit, repeated trauma, infections, or adverse effects of drugs used in treatment resulting in involvement of nail plate, matrix, bed and periungual skin(3,4). There are limited studies on nail changes in leprosy showing nail involvement in which changes were studied in groups of paucibacillary and multibacillary which do not represent complete spectrum of disease. Hence, this is a study to determine prevalence, pattern, clinical characteristics and severity of nail involvement in different spectrums of leprosy. Further they were divided according to age, sex and duration of disease.

AIMS AND OBJECTIVES

The objective of the study is to determine clinical patterns of nail changes in leprosy patients. It also aims to evaluate frequency, severity of nail involvement in different spectrums of leprosy accessing a tertiary care centre.

MATERIALS AND METHODS

It was an Observational Cross-Sectional study conducted at Outpatient Department of D.V.L, OGH for a period of 18 months from 2020 December to may 2022. Ethical committee clearance and written informed consent was obtained.

Inclusion Criteria.

Patients who did not give consent and patients with diabetes, vitamin B12 deficiency, HIV, hereditary neuropathies, trauma related peripheral nerve disease were excluded from study.

Using a preset proforma, data on age, gender, duration of disease was made. Detailed cutaneous and neurological examination was done. Deformities of hands and feet were graded according to WHO guidelines(5). Nail changes in these patients were noted in a pre-designed proforma having detailed examination of all fingers and toes. Clinical photographs of fingers and toes were taken for record purpose. KOH mount and culture were done in suspected fungal infections. Patients were grouped according to Ridley-Jopling classification into polar tuberculoid (TT), borderline tuberculoid (BT), mid-borderline (BB), borderline lepromatous (BL) and polar lepromatous (LL) disease for purposes of analyses(6). Further, they were subdivided as per age (less than 25 years, 25-50 years and more than 50 years), sex (male, female) and duration of disease (less than 2 years from diagnosis and more than 2 years from diagnosis). A subgroup of patients having erythema nodosum leprosum reaction within the last 3 months was made. Nail changes in these groups were summarized and compared.

OBSERVATIONS AND RESULTS

Out of 100 patients included in the study, 14 (14%) were having TT leprosy, 35 (35%) were having BT leprosy, 1 (1%) had BB leprosy, 16 (16%) were having BL leprosy, 34 (34%) were having LL leprosy. 12 TT patients, 24 BT patients, 1 BB patient, 15 BL patients, 28 LL patients were having nail changes. The overall prevalence is 80% with prevalence of 85.7% in TT group, 68.5% in BT group, 100% in BB group, 93.7% in BL group and 82.3% in LL group. 12 out of 15 ENL patients show nail changes.

In the TT group, prevalence of nail changes was more in younger patients, in BT, BL, BB and LL changes were more common in middle aged patients. Nail changes were more prevalent among males in all groups. Onycholysis, subungual

hyperkeratosis, rudimentary nails, anonychia, brown black discoloration, onychoschizia were more common in males. Changes were more frequent in newer cases in TT and BT groups while in BB, BL and LL groups, older cases were having more changes. Pattern of nail changes in TT and BT group were similar over the duration while in BL and LL groups

longitudinal melanonychia, longitudinal ridging, Beau's lines, subungual hematoma, onycholysis, sub ungual hyperkeratosis, onychoschizia, leukonychia were more frequent in less than 2 years of duration, while onychauxis, onychorrhexis, rudimentary nails, brachyonychia, anonychia were common in cases with more than 2 years of duration.

Table 1 Shows The Clinical Profile Of The Nail Changes As Per Age, Sex And Duration Of Disease.

Group	Status	TT	BT	BB	BL	LL	Total
Overall	Present	12 (85.7%)	24 (68.5%)	1 (100)	15 (93.7%)	28 (82.3%)	80 (80%)
	Absent	2 (14.2%)	11 (31.4%)	-	1 (6.25%)	6 (17.6%)	20 (20%)
Age							
<25 yrs	Present	8 (80%)	9 (69.2%)	-	4 (100%)	3 (75%)	24 (77.4%)
	Absent	2 (20%)	4 (30.7%)	-	-	1 (25%)	7 (22.5%)
25-50 yrs	Present	4 (100%)	15 (78.9%)	-	8 (88.8%)	20 (83.3%)	48 (84.2%)
	Absent	-	4 (21%)	-	1 (11.1%)	4 (16.6%)	9 (15.7%)
>50 yrs	Present	-	2 (66.6%)	-	3 (100%)	5 (83.3%)	10 (83.3%)
	Absent	-	1 (33.3%)	-	-	1 (16.6%)	2 (16.6%)
Sex							
Male	Present	9 (90%)	18 (78.2%)	-	9 (90%)	21 (84%)	57 (83.8%)
	Absent	1 (10%)	5 (21.7%)	-	1 (10%)	4 (16%)	11 (16.1%)
Female	Present	3 (75%)	8 (66.6%)	-	6 (100%)	7 (77.7%)	25 (78.1%)
	Absent	1 (25%)	4 (33.3%)	-	-	2 (22.2%)	7 (21.8%)
Duration							
<2 yrs	Present	10 (90.9%)	21 (75%)	-	10 (90.9%)	17 (80.9%)	59 (81.9%)
	Absent	1 (9%)	7 (25%)	-	1 (9%)	4 (19%)	13 (18%)
>2 yrs	Present	2 (66.6%)	5 (71.4%)	-	4 (80%)	11 (84.6%)	22 (78.5%)
	Absent	1 (33.3%)	2 (28.5%)	-	1 (20%)	2 (15.3%)	6 (21.4%)

Details About Prevalence And Frequency Of Finger And Toe Nail Involvement Are Given In Table 2.

Finger / toe nail changes	TT	BT	BB	BL	LL	Total	ENL
With only finger nails	5 (35.7%)	6 (17.1%)	0	2 (12.5%)	4 (11.7%)	17	2 (16.6%)
With only toe nails	3 (21.4%)	4 (11.4%)	0	4 (25%)	5 (14.7%)	16	3 (25%)
With both finger and toe nails	4 (28.5%)	14 (40%)	1 (100%)	9 (56.2%)	19 (55.8%)	47	7 (58.3%)
Total with finger involvement	9 (64.2%)	20 (57.1%)	1 (100%)	11 (68.7%)	23 (67.6%)	64	9 (75%)
Total with toe involvement	7 (50%)	18 (51.4%)	1 (100%)	13 (81.2%)	24 (70.5%)	63	10 (83.3%)

Table 3 Show Details Of Finger Nail Changes As Per Spectrum Of Disease

Sr no	Findings	TT	BT	BB	BL	LL	Total	ENL
1.	Longitudinal melanonychia	5 (35.7%)	11 (31.4%)	-	5 (31.2%)	14 (41.1%)	35 (35%)	4
2.	Longitudinal ridges	3 (21.4%)	9 (25.7%)	-	5 (31.2%)	12 (35.2%)	29 (29%)	3
3.	Leukonychia	4 (28.5%)	5 (14.2%)	-	3 (18.7%)	1 (2.9%)	13 (13%)	-
4.	Onycholysis	-	3 (8.5%)	1 (100%)	3 (18.7%)	3 (8.8%)	10 (10%)	1
5.	Transverse lines	1 (7%)	3 (8.5%)	-	2 (12.5%)	3 (8.8%)	9 (9%)	4
6.	Onychoschizia	1 (7%)	1 (2.8%)	-	2 (12.5%)	2 (5.8%)	6 (6%)	1
7.	Nail Pallor	-	1 (2.8%)	-	2 (12.5%)	2 (5.8%)	5 (5%)	-
8.	Brown black discoloration	-	-	-	2 (12.5%)	3 (8.8%)	5 (5%)	-
9.	Brachyonychia	-	-	-	2 (12.5%)	3 (8.8%)	5 (5%)	-
10.	Subungual hematoma	-	1(2.8%)	-	2 (12.5%)	2 (5.8%)	5(5%)	-
11.	Anonychia	-	-	-	1(6.2%)	3(8.8%)	4(4%)	-
12.	Rudimentary nail	-	-	-	1(6.2%)	2(5.8%)	3(3%)	-
13.	Subungual hyperkeratosis	-	1(2.8%)	-	1 (6.2%)	1 (2.9%)	3 (3%)	1
14.	Onychauxis	-	-	-	1(6.2%)	2(5.8%)	3(3%)	-
15.	Paronychia	-	1(2.8%)	-	-	1(2.9%)	2(2%)	-
16.	Onychorrhexis	1 (7%)	-	-	-	-	1(1%)	-
17.	Polyonychia	-	-	-	-	1(2.9%)	1(1%)	-
18.	Macrolunula	-	1(2.8%)	-	-	-	1(1%)	-

Table 4 Show Details Of Toenail Changes As Per Spectrum Of Disease

Sr no	Findings	TT	BT	BB	BL	LL	Total	ENL
1.	Longitudinal melanonychia	3 (21.4%)	8 (22.8%)	-	2 (12.5%)	8 (23.5%)	21 (21%)	4
2.	Longitudinal ridges	2 (14.2%)	6 (17.1%)	-	3 (18.7%)	5 (14.7%)	17 (17%)	3
3.	Subungual hyperkeratosis	1 (7%)	6 (17.1%)	-	5 (31.2%)	5 (14.7%)	17 (17%)	2
4.	Transverse lines	3 (21.4%)	7 (20%)	-	5 (31.2%)	6 (17.6%)	16 (16%)	6
5.	Brown black discoloration	-	2 (5.7%)	1 (100%)	8 (50%)	5 (14.7%)	16 (16%)	3
6.	Onycholysis	1 (7%)	6 (17.1%)	-	3 (18.7%)	5 (14.7%)	15 (15%)	2
7.	Onychorrhexis	1 (7%)	2 (5.7%)	-	4 (25%)	5 (14.7%)	12 (12%)	2
8.	Onychoschizia	1 (7%)	2 (5.7%)	1 (100%)	1 (6.2%)	6 (17.6%)	11 (11%)	2
9.	Brachyonychia	-	-	-	5 (31.2%)	6 (17.6%)	11 (11%)	2
10.	Onychauxis	-	2 (5.7%)	-	2 (12.5%)	7 (20.5%)	11 (11%)	2
11.	Subungual Hematoma	-	-	-	3 (18.7%)	4 (11.7%)	7 (7%)	-
12.	Rudimentary nail	-	-	-	2 (12.5%)	4 (11.7%)	6 (6%)	-

13.	Anonychia	-	-	-	1 (6.2%)	5 (14.7%)	6 (6%)	-
14.	Nail Pallor	-	1 (2.8%)	-	-	2 (5.8%)	3 (3%)	-
15.	Leukonychia	-	2 (5.7%)	-	-	-	2 (2%)	-
16.	Paronychia	-	1	-	-	1	2 (2%)	-

In TT patients, changes were more common in fingernails were more common but in BT,BL and LL patients, changes were more common in toenails.

All finger nail changes are summarized in Table 3,and toe nail changes are summarized in Table 4.

Longitudinal melanonychia was the most common finding in fingernails, followed by longitudinal ridges, leukonychia, onycholysis, transverse lines. Longitudinal melanonychia was commonest change in toenails followed by longitudinal ridging, subungual hyperkeratosis, transverse lines, onycholysis, brown black discoloration, onychorrhexis, brachyonychia, onychauxis, onychoschizia and subungual hematoma .Longitudinal melanonychia, longitudinal ridging, transverse lines, leukonychia, onycholysis and subungual hyperkeratosis were more common among tuberculoid pole while longitudinal melanonychia, longitudinal ridges, brown black discoloration, brachyonychia, transverse lines, onycholysis, subungual hyperkeratosis, onychauxis, onychoschizia were more common among lepromatous pole. Longitudinal melanonychia was commonest in TT and BT patients,brown black discoloration in BL patients and longitudinal melanonychia in LL patients. Anonychia, brachyonychia, rudimentary nails were seen only in lepromatous pole and not found in tuberculoid pole. Transverse lines were more frequent in ENL patients.

DISCUSSION:

We found various nail changes in leprosy patients in our study. The overall prevalence was 80% in our study similar to study by Chetan D.Rajput(2) while in study conducted by Ruovinuo Theunuo et al. (7) had 93.3%, El - Darouti et al. (8) had 86%,Kaur et al.(3)had a prevalence of 77.3 %, Patki and Baran (4) had a prevalence of 64%.

In TT group prevalence of changes was more in younger and newer patients, in BT group changes was more in middle aged and newer patients while in BL and LL groups, changes were more prevalent in older and in those who have completed treatment implying early onset nail changes in tuberculoid pole in support to study by Patki and Baran(4).

Different patterns of nail changes in different spectrums implying the role of multiple causes like neuropathy, repeated trauma, vascular impairment, infections, acro-osteolysis and adverse effects of drugs (4,9) similar to findings of Kaur et al.(3). In comparative study of nail changes by El-Darouti et al. between leprosy patients and diabetic patients with neuropathies, nail changes were more prevalent in leprosy patients suggesting multifactorial causation in leprosy(8). Toenails were more commonly involved than fingernails due to repeated trauma.



Figure 1 showing longitudinal melanonychia

Longitudinal melanonychia (Figure 1) and longitudinal ridges (Figure 2) were most common findings similar to Kaur et al. and El-Darouti et al.(3,8). As per the study by Baran it is due to stimulation of nail matrix melanocytes by repeated trauma and also due to clofazimine(2,10).



Figure 2 showing longitudinal ridging

Subungual hyperkeratosis(Figure 3) was more commonly observed in Lepromatous pole and is likely to be an adverse effect of clofazimine therapy (11).Onycholysis (Figure 4) was more common in lepromatous pole which may be a result of repeated trauma and can get secondarily infected resulting in yellowish green nails(2,12).



Figure 3 showing onycholysis with subungual hyperkeratosis



Figure 4 Onycholysis Of Left Great Toe Nail

Pallor of the nails (figure 5), although not specific to disease, can be due to anemia due to the anti-leprosy drugs, preferably dapson, partly due to disease itself and vascular impairment(4,7).



Figure 5 Showing Pallor Of Nails

Onychauxis (Figure 6), onychorrhexis (Figure 7) and onychoschizia (Figure 8) were more common in lepromatous spectrum which are the result of trophic changes due to neuropathy and vascular impairment(13,14). Leukonychia (Figure 9) was commonly seen in the tuberculoid spectrum. It is a distal nail matrix keratinisation disorder secondary to trauma(15). Trophic changes were more prevalent in patients with grade 1 deformity.



Figure 6 Showing Onychauxis



Figure 7 showing onychorrhexis of great toe nail and brown black discoloration of nails



Figure 8 showing onychoschizia



Figure 9a showing true leukonychia



Figure 9b showing punctate leukonychia

Transverse lines was (Figure 10) one of the common findings in our study and it was more frequent in ENL patients. They appear due to trauma, vasculitis in ENL and as a side effect of Dapsone (15,16).



Figure 10 showing transverse lines

Brachyonychia (Figure 11) is decrease in longitudinal length of nail. In leprosy, it occurs due to acro-osteolysis and subsequent loss of tissue pad of the fingers. More severe acro-osteolysis leads to changes like parrot beak nails, rudimentary nails (Figure 12) and anonychia (Figure 11)(2,15). These changes were more prevalent in BL and LL groups, especially in patients with grade 2 deformities including trophic ulcers.



Figure 11 showing brachyonychia of ring and little finger nails and anonychia of middle finger nail



Figure 12 showing rudimentary nails

Splinter hemorrhages and subungual hematoma (Figure 13) were more prevalent in lepromatous pole. Trauma is the common cause(15).



Figure 13 showing subungual hematoma

Onychoheterotopia (Figure 14) is growth of nail tissue in any site other than the classical nail unit areas is associated with acro-osteolysis which occur after a single overwhelming trauma or after chronic repetitive injuries leading to splitting and implantation of the germinal matrix or heterotopic inoculation of the oncocytes(15).



Figure 14 Showing Onychoheterotopia

Onychomycosis and chronic paronychia were seen in very few patients. This is attributed to dryness due to neuropathy resulting in unfavorable conditions for fungal growth(4).

Onychogryphosis is gross hyperkeratosis and increased curvature of nail plate occurs as a result of repeated injury and clofazimine drug (15).

Flag sign, shoreline nail, onychogryphosis and pterygium unguis are some changes found in leprosy but had not been detected in our study(15).

Premanshu *et al.* reported a case with bilateral dystrophy of medial fingernails as a presenting feature in leprosy patient leading to a diagnosis of disease (17). Thus, awareness of nail changes can help even in diagnosis of disease.

Limitations of our study include as this was an observational study, difficulty to distinguish and analyze the changes before diagnosis of disease.

CONCLUSION

Nail changes in leprosy although not specific but are very characteristic and multifactorial. Besides neuropathy and trauma, vasculopathy, infections and drugs may result in genesis of these changes. Pathology of nails can guide us in diagnosing the type of leprosy, for predicting complications of disease itself or of drugs used in treatment. So, as a part of complete examination, nails should always be examined in

case of leprosy. Early diagnosis and treatment of leprosy can prevent nail deformities.

REFERENCES

1. Kumar, B., Hemanta Kumar Kar, & Dogra, S. (2023). *IAL Textbook of Leprosy*. JP Medical Ltd.
2. Rajput, C. D., Nikam, B. P., Gore, S. B., & Malani, S. S. (2020). Nail Changes in Leprosy: An Observational Study of 125 Patients. *Indian Dermatology Online Journal*, 11(2), 195–201. https://doi.org/10.4103/idoj.IDOJ_172_19
3. Kaur, I., Chakrabarti, A., Dogra, S., Rai, R., & Kumar, B. (2003). Nail involvement in leprosy: a study of 300 patients. *International journal of leprosy and other mycobacterial diseases : official organ of the International Leprosy Association*, 71(4), 320–327. [https://doi.org/10.1489/1544-581X\(2003\)071<0320:NIILAS>2.0.CO;2](https://doi.org/10.1489/1544-581X(2003)071<0320:NIILAS>2.0.CO;2)
4. Patki, A. H., & Baran, R. (1991). Significance of nail changes in leprosy: a clinical review of 357 cases. *Seminars in dermatology*, 10(1), 77–81.
5. World Health Organization (2012). WHO Expert Committee on Leprosy. *World Health Organization technical report series*, (968), 1–61.
6. Abulafia, J., & Vignale, R. A. (1999). Leprosy: pathogenesis updated. *International Journal of Dermatology*, 38(5), 321–334. <https://doi.org/10.1046/j.1365-4362.1999.00650.x>
7. Sasidharanpillai, S., Theunuo, R., Ajithkumar, K., George, B., & Salim, R. (2020). Nail changes in leprosy: Onychoscopy evaluation. *Indian Dermatology Online Journal*, 11(6), 970. https://doi.org/10.4103/idoj.idoj_29_20
8. El Darouti, M., Hussein, S., Al Tahlawy, S., Al Fangary, M., Mashaly, H., El Nabarawy, E., Al Tawdy, A., Fawzi, M., & Abdel Hay, R. (2011). Clinical study of nail changes in leprosy and comparison with nail changes in diabetic patients. *Journal of the European Academy of Dermatology and Venereology*, 25(3), 290–295. <https://doi.org/10.1111/j.1468-3083.2010.03783>
9. Belinchón Romero, I., Ramos Rincón, J. M., & Reyes Rabell, F. (2012). Las uñas en la lepra [Nail involvement in leprosy]. *Actas dermo-sifiliográficas*, 103(4), 276–284. <https://doi.org/10.1016/j.ad.2011.07.011>
10. Baran R. (1987). Frictional longitudinal melanonychia: a new entity. *Dermatologica*, 174(6), 280–284. <https://doi.org/10.1159/000249199>
11. Dixit, V. B., Chaudhary, S. D., & Jain, V. K. (1989). Clofazimine induced nail changes. *Indian journal of leprosy*, 61(4), 476–478.
12. Hengge, U. R., & Bardeli, V. (2009). Images in clinical medicine. Green nails. *The New England journal of medicine*, 360(11), 1125. <https://doi.org/10.1056/NEJMicm0706497>
13. Kaur, S., Wahi, P. L., Chakravarti, R. N., Sodhi, J. S., Vadhwa, M. B., & Khera, A. S. (1976). Peripheral vascular deficit in leprosy. *International journal of leprosy and other mycobacterial diseases : official organ of the International Leprosy Association*, 44(3), 332–339.
14. SAMMAN, P. D., & STRICKLAND, B. (1962). Abnormalities of the finger nails associated with impaired peripheral blood supply. *The British journal of dermatology*, 74, 165–173. <https://doi.org/10.1111/j.1365-2133.1962.tb13484.x>
15. Ramos, J. M., Reyes, F., & Belinchón, I. (2013). Nail Changes in Recent and Old Leprosy Patients. *DOAJ (DOAJ: Directory of Open Access Journals)*, 44–52. <https://doi.org/10.33590/emjdermatol/10312034>
16. Patki, A. H., & Mehta, J. M. (1989). Dapsone-induced erythroderma with Beau's lines. *Leprosy review*, 60(4), 274–277. <https://doi.org/10.5935/0305-7518.19890034>
17. Bhushan, P., Aggarwal, A., Yadav, R., & Baliyan, V. (2011). Bilateral medial fingernail dystrophy as a presenting feature in a patient with leprosy. *Leprosy review*, 82(1), 74–77.